

671:4,9 mixed 712:19 mixture 697:20 721:19 805:7 830:1 847:24 model 681:7,9 731:15 732:7 800:7 802:1,7 molecular 701:10 755:25 molecules 707:21 money 692:19,21 Monica 644:16 645:17 649:1 668:5,10 monocytes 751:16 751:16 752:5 mononucleotizing 753:25 monoortho 770:12 774:22 monoorthosubsti... 770:4 month 704:6,10 months 659:13 665:25 676:13 691:1 752:2 753:2 Morbidity 647:19 morning 675:17 700:9 774:10 Morris 827:11,14 827:21,24 828:3 828:19 829:6 830:12,17 831:11 mortality 648:8 811:8 822:16 823:9 moth 739:19,24 740:1,9 mother 660:15,17 681:11,19 682:22 685:9 690:23 817:20 mother's 681:16 mouse 697:2 698:14 mouse's 697:21 698:22 mouse-feeding 697:25 move 701:15 728:2 728:4 764:9 827:9 moved 681:19,25 690:23 691:5,7 701:25 728:6 Moving 809:1	MSP 779:25 multifactorial 766:12 multiple 768:18 802:5 multiply 760:23 municipal 647:18 776:21 781:10 Muscat 830:21 831:3,12,13,17 832:22 833:20 833:21 834:16 834:19 mutagenicity 788:16 Mutation 746:25 747:1 Mysteries 655:20 mystery 711:18 M-A-N-Z 822:2,10 822:11 M-e-t-h-i-m-a-z-... 726:24 M-e-t-r-o-n-i-d-... 725:21 M-i-t-r-a 671:3 M-U-S-C-A-T 830:21 M.D 644:15 645:15 647:3 649:4 673:12,13,13,19 857:7,20 N Nadine 701:22 name 669:8 671:2 672:7 673:8 683:6 685:20 742:19 746:23 802:12 858:15 named 687:23 names 677:3 742:18 Naperville 740:2 naphthalene 715:11 721:22 722:22 737:4 738:5,9 739:10 739:18,19,24 740:1,10 Narrate 734:5 narrative 659:4 nasal 723:5,8 737:5 nation 669:4 National 686:18 799:6 native 768:5 855:9 natural 686:7	naturally 659:21 nature 712:9 714:8 714:10,17,17 801:17 near 777:4,15 854:6 nearly 827:7 necessarily 775:22 782:11 necessary 702:10 781:19 806:13 830:13,18 834:17 843:6 necessity 684:21 need 656:24 663:3 696:14 712:4 726:13 743:12 771:6 776:2 820:14 833:14 833:16 836:15 842:6 needed 736:22 771:1 810:24 816:18 needs 691:11 730:25 negative 699:12 773:24 774:1 778:11 788:12 804:2,5,10 805:9 832:20 835:15 837:11 840:7,10 Negri 835:23 836:5 836:12,20 837:10 neighbor 714:7 neighborhood 650:22 651:23 653:21 654:4 706:20 neither 699:14 858:11 neonatal 701:8 neoplasms 811:21 813:18 823:11 neuroblastoma 738:1 Neuroblastomas 737:16 neurological 705:15 709:5,5 never 666:3 674:9 681:4 704:19,22 724:14 725:12 731:11 768:2 781:8 785:5 new 671:22 672:5 672:12 673:22 674:10 677:1	678:6 680:10 709:14 710:4,13 710:13 751:4 797:3 801:25 810:18 831:7 838:13 nine 647:23 691:1 799:17,24 806:24 812:5 823:7 ninefold 821:1 nitrotoluene 695:9 noisy 655:19 nondetect 713:6 nonlinear 718:19 nonsignificant 796:23 nonsmoker 750:3,8 750:9,18 nonsmokers 749:10 750:20 764:14,16 nonstick 706:1 non-absorbable 826:25 Non-Ah 846:9 non-genotoxic 844:17,23 non-white 671:8 non-whites 669:18 normal 656:16 658:19 664:15 684:21,22 694:20 717:8 750:25 787:7 normally 760:18 NORTHERN 644:2 645:2 nose 723:10 737:7 notation 844:22 noted 738:21 857:10 notes 655:20 811:5 notice 702:21 803:25 noting 694:5 notion 666:20 740:18 793:12 793:15 Novel 647:11 NPT 737:9 NTP 737:13,14,14 737:21,22 738:4 nuclear 751:15 nucleotides 751:5 758:21,22 null 757:24,24 number 659:10,11 661:22 664:14	666:8 688:14 691:21 692:11 707:4 719:18 730:2 733:19 736:18 751:3 755:10 785:21 793:12 795:21 799:12 806:24 808:7,15 812:10 812:11 814:8 818:6 819:9 827:10 830:21 834:14 numbers 664:23 684:2 750:21 779:22 812:21 813:6 824:16 833:15,16 840:23 841:22 841:23,25 numerous 774:21 nurses 648:5 814:17,21,23,25 815:2,4,10 816:3 nuts 784:4 nylon 655:6,8,10 655:10,11,14,25 656:4,5,7,9 N-E-G-R-I 835:23 O oath 649:10 858:6 obese 662:7 obesity 662:1,2 663:3,23 obligate 723:10 obscure 854:25 observation 803:10 observations 803:6 813:4 observe 742:6 observed 852:24 obtained 658:12 659:14 797:17 obviously 678:7 684:21 752:15 760:16 773:21 occasionally 704:10,19 occupation 839:19 occupational 699:15 700:1 795:24 796:19 799:3 839:1,4,12 840:19 843:1 occupations 839:7 839:14 occur 654:23 684:4	716:22 728:13 798:4 847:12 occurred 690:3 791:24 occurrence 699:17 716:3,4 717:12 occurring 793:3 OCDD 653:1,6 Ocean 645:16 odd 841:1 odds 768:18,20 775:4 796:23 798:14 800:5,21 801:3 811:23 820:20 821:16 842:2 oestrogenic 809:21 offhand 716:2 781:24 office 757:1 OFFICES 646:3 offspring 668:21 686:3 691:20 Ofentimes 798:2 oh 681:15 696:25 710:1 792:1 794:25 795:7 840:2,18 842:14 843:21 oil 697:24 oils 827:1 okay 653:7 657:6 659:6 660:25 662:6,13,16 664:3 670:18 671:4 674:25 676:10 690:22 701:16 707:14 709:11 710:5 711:4 712:21 713:13 718:24 734:15 735:25 736:5 739:17 742:5 745:23 746:23 754:8 759:9,13 763:15 763:18 766:25 767:5 769:14 779:10,16 786:17 798:21 799:8 800:10 801:1 816:6,11 823:14 840:5 843:24 847:11 848:9 850:10,16 853:16 854:23 855:21 856:1 old 681:23 733:1 739:19 747:22
--	---	---	---	---	---

777:5 older 682:6,7 683:7 747:23 791:18 838:15 oldest 720:17 Olestra 826:15,17 826:24 once 690:1 702:25 726:15 736:13 736:17 760:22 820:14 832:5 ones 665:7 670:2 670:10 690:20 752:16 757:23 757:23 775:7 786:11 809:13 ongoing 650:14 732:21 740:24 onset 826:6 oophorectomy 662:20 open 695:1 operation 654:22 opinion 754:6 821:21 opinions 738:8 opposed 700:12 704:13 745:9 759:5 761:21 770:19 793:18 851:16 opposite 663:7 oral 719:13 order 683:6 696:7 801:16 802:10 806:23 810:5 814:4 819:9 821:25 836:16 838:5 843:8 organ 723:17 793:23,24 813:19 organic 647:9 667:4 675:1 organochlorine 647:24 648:12 699:16 701:12 807:8,12,14 809:19 831:6 832:16 organogenesis 694:9 organotrophotro... 723:14,15,18 organs 813:6 original 689:5 outcome 697:9 700:14 outcomes 667:22	701:1,4 outside 786:4 850:13 outtakes 731:12 outweigh 805:9 oven 756:8 757:22 758:4 763:20 ovens 759:19 overall 665:20 671:21 796:14 803:11 805:6,13 823:3 841:13,13 850:21 overexposure 730:4 overlap 850:15 overly 699:20 overwhelmed 730:3 owned 650:7 Oxazepam 727:1 o'clock 856:2 o-o-p-h-o-r 662:21 O-x-a-z-e-p-a-m 727:2 P p 779:17 780:7,11 780:15 791:13 791:13 809:25 835:19 page 647:8 648:2 687:18,19 694:6 696:5 699:5,14 732:14 733:15 733:24 738:22 740:17 753:23 754:12 763:9,10 763:15,16 766:14,19,24 767:17 772:20 772:20 774:4,4 777:14,15 792:19 801:13 804:14 808:13 809:1,18 823:9 834:19 842:3,12 845:3 846:13 848:14 851:4 pages 761:7 764:2 848:20,22 PAH 650:15 680:20 681:1 684:3 688:17,18 688:20,20 695:11,12 715:11,24 716:16,24 717:7 717:9,16 719:8	719:13,20 720:1 720:7,21 721:12 721:23,24 722:7 744:18,20 748:6 748:9,13,23 749:1,23 750:19 751:6,11 752:8,9 753:9,10,16,24 754:1,3,11,19 755:3,4,8 756:4 756:14 757:3,4,7 757:10,13 758:20 759:14 759:25 760:3 761:3,8 762:2 763:10,17 777:10,19 788:19 828:10 829:7 839:20,20 841:19,20,20 848:5,8 PAHs 691:22 695:13,25 717:2 717:22 718:5 720:2 721:21 722:1,16 747:16 748:8,25 750:17 753:18 754:9 758:13 763:13 777:7 781:23 788:13 789:12 796:10 797:1 828:2,4 829:11 829:24 830:5,11 839:13,15 842:24 843:3 844:15 846:15 846:23 847:9,21 847:23 848:10 848:12 PAH's 845:22 paid 650:8 Pam 673:4,10,13 paper 664:6 666:3 669:5 670:25 671:4,9 672:15 674:25 675:3,5 675:15,18 683:25 685:24 686:5,20 687:21 687:23,25 689:3 689:4 692:10,20 693:8,15,16,23 695:4 696:4,6 698:2 702:2,9 703:9 708:20,21 709:12,18 712:6 737:16 745:15 745:17 747:1,16	747:17,24 748:2 749:8 754:23 755:14,20,24,24 756:13,17,18,20 756:21 757:15 757:15 763:20 763:25 764:9,13 764:16,20 765:21,22 770:22 771:7 773:20,23 776:18 778:1,2 781:21 782:16 782:20 783:5,7 783:10,10,24,25 784:8,11,15,25 785:8,13,14,20 790:2 791:23 797:17 798:6 800:17 806:16 806:23,24 807:6 810:7,12 812:4 813:22 814:4,5 814:15,17 816:2 817:4 818:12 819:16,21,24 820:1,6 821:19 821:20 822:1,5,8 823:13 824:3,8 825:12 827:9,11 827:14,20,21,21 827:23 828:3,15 830:9,20 831:3 832:9,19,22 833:10 834:16 837:11 838:5,16 838:17,22 840:14 842:22 842:22 843:14 844:12,24 847:6 848:2,9 849:9,17 849:23 853:19 854:12,17 papers 672:8 685:23 693:20 745:18 747:4,11 747:23 749:15 754:22 755:2,8 765:8 783:22 791:23 797:21 821:22 828:14 830:9 833:11 837:13 838:13 838:15 855:11 paradoxin 770:5 paragraph 700:11 796:15 832:12 842:4,12 845:4 paragraphs 694:22	parasites 726:5 parity 661:20,21 Park 777:2,4,8 779:15,19,24 780:12,20,21 785:11 Parker 706:21 Park's 779:6 part 654:17 670:1 670:2 672:13 682:22 732:21 733:23 740:24 760:21 772:10 836:19 partially 845:9 participate 733:18 particular 664:5 683:21,24 685:20 689:16 710:20 715:8 717:15 758:10 758:13 759:20 775:21 779:4 781:14 782:7 788:2 806:13 813:25 816:3,21 817:8,14,20,23 820:21 829:6,7 829:25 830:5,13 830:17 840:3 847:11,21,23 850:7 particularly 708:22 711:13 714:16 795:7 796:9 807:15 811:3 817:16 818:22 839:6 particulates 708:4 708:6,12 parties 858:13 parts 713:10,10 737:24 738:2 834:6 pass 682:6 passage 676:1 passed 658:1,8 Path 755:25 pathogenesis 766:12 pathways 770:11 patient 663:14 715:12 720:22 720:25 723:22 759:9,15,18 760:17 764:23 764:25 774:15 793:13 831:24 patients 674:19	705:6 710:8 717:6,10,10,25 718:1 725:11 726:10 732:5 757:20 770:19 790:12 793:8,17 794:2 833:18,19 834:1 841:18 pattern 791:7 patterns 687:1 754:2 758:18 Paul 780:3 pay 729:1,4,6 paying 813:12 PB 800:6 PBDE 708:16 709:1,8,14,23 710:18 711:7,22 712:2,11,24 PBDEs 709:25 711:9 712:10,17 713:2,5 PCB 647:23 667:13 668:6 676:6 683:21 704:21,23 765:25 766:5,6 766:24 767:2,7 767:13 768:19 768:22 769:10 770:1,2,2,8 772:14,23 773:9 773:16 774:18 775:2,6,21 776:2 776:4,6 791:1,16 791:20 793:9,17 799:18,24 800:22 801:2,10 802:17 803:1 804:6,16 805:4 806:13 809:24 815:21 817:4 820:2,19 821:15 821:22 831:14 833:1 834:9,10 836:9,25 837:16 837:25 PCBs 653:15 666:24 683:21 709:7 712:14 713:3 766:11,20 770:12,15 773:5 773:8 774:20 776:7 790:10,23 791:2,7,10,11 792:12 793:6,13 795:6 802:6 806:6 807:17 809:6,10,12
---	--	--	--	---	---

816:14,25 818:2 831:9,22 832:1 833:7 837:20 PCB's 648:13 676:21 PCDD 851:10 PCDF 712:16 851:10 PDBE 712:23 peaks 791:8,9,12 peanut 697:24 Pecoraro 677:17 679:19,20 peer-reviewed 755:1,8 756:2,14 757:2 penalty 857:8 Penco 653:17 pending 775:20 Pension 799:6 people 650:21 651:22 652:19 652:20 664:21 672:23 676:15 676:17 677:4 690:1 692:18 693:6 700:21 704:17,19 705:4 707:24 709:10 709:15,23 710:14 714:3,6 717:17,22 725:9 725:15 728:2,10 728:13 730:2 731:20 732:17 733:7,19 734:23 734:25,25 735:20,20,22,23 735:25 736:7,16 736:25 742:12 741:15,20,23 742:3,14 746:12 756:9,10 759:5,6 759:23 761:2,7 761:24 762:10 762:16,19 764:17 781:7,9 782:23 784:4,5 784:14 792:1 805:25 806:1 810:19 812:11 817:16 821:16 826:21 829:22 835:2 841:11 843:3 851:14,18 852:15 854:2 855:14 people's 689:6 798:22	percent 652:24 665:22 669:22 670:12 705:10 727:23,25 728:15,16 729:15,20 730:12 751:20 754:11 761:12 761:14,16 779:3 779:6 808:24 812:14 822:22 823:4,18 855:15 855:19 percentage 753:21 Perera 747:7,8,13 747:18 755:13 755:20,24 Perfluorooctanoic 706:7 perinatal 701:11 period 652:24 perjury 857:8 persistent 647:9 667:4 675:1 687:1 person 692:18 710:18 758:7 759:11 795:1 personal 781:7 person's 706:24 710:20 720:9 perspective 705:22 pesticide 739:24 807:13,14 850:5 pesticides 647:21 790:5,11 850:6 Petralia 797:2 838:6,8,10,12,12 838:22,24 840:14 842:22 843:5 petre 844:8 PHAHS 686:24 Phenobarbital 724:21 phenoxy 811:18 813:14 Philips 756:24 Phillips 754:5 763:14,20 764:9 764:10,12,13 phlebotomist 736:21 742:10 742:12 743:9 phlebotomists 742:17 phlebotomy 742:15 phone 655:18,18	phonetic 827:2 phony 729:3 phraseology 768:2 Ph.D 673:14,15 picked 733:13,17 733:22 734:1 735:20 picogram 851:13 851:16 picograms 853:1,2 855:24 piece 654:16 Pier 668:10 pile 736:19 pills 660:19 684:25 818:20 place 734:11,12 858:4 placebo 674:11,12 674:15 placed 858:6 places 740:5 plaintiffs 644:6 645:6 646:2 654:5 741:4,4 749:2 758:16 761:10 plan 740:25 plant 648:9 651:23 652:10 653:17 654:1,2,3,6,12 655:9 656:10,13 732:22 734:13 734:22 735:6 777:5 822:13,19 822:23 824:10 850:5,14 851:12 851:15 854:6,8 854:11 plants 656:18,19 Plasma 647:15 769:21 playing 781:11 plays 720:14 plea 693:22 Pliskova 843:9,13 843:25 844:3,11 847:6 848:2,9 plus 680:2 682:18 754:11 802:6 847:9 point 667:3 673:25 674:14 690:11 698:4 699:21 701:5 708:20,21 729:9 744:14 747:19,22 754:24 759:21 764:10 783:15	797:9,24 803:24 804:15 812:19 813:9 816:2 823:13 824:2 830:10 832:3,3 832:12 835:12 836:14 837:12 837:15,18 846:2 846:8 850:18 pointing 830:9 846:11 points 705:13 706:10 708:25 709:7 829:24 poison 825:2 poisoning 825:7,7 825:20 826:1 Poland 746:19 756:9 policy 692:17 693:3 718:12 pollutants 647:9 667:4 675:1 768:11 pollution 653:21 669:21 670:19 670:22 850:11 polybrominated 708:16 712:24 polychlorinated 647:14,16,21 648:4 769:21 790:5 799:18 828:11 polycyclic 648:15 839:1 polyhalogenated 686:24 polymorphism 758:5,11 759:20 768:13 816:4,17 816:20 817:8,21 837:17 polymorphisms 757:11,16,21 758:15 polymorphonuc... 753:5 polyunsaturated 829:1 pooled 713:9 poor 666:19 pops 712:13 popular 656:7 661:17 popularly 695:21 population 664:20 707:2 728:8 746:21 756:16	759:5,6 771:18 778:3 779:3,23 794:3 812:9 816:9 817:3 836:17 837:1 850:17 populations 759:7 777:18 806:7 position 675:7 positive 662:22,23 749:20,22 750:1 774:1 786:18 788:13 791:22 804:11,12 805:2 805:9 834:21 839:23,25 840:2 840:7,9 positively 804:1 positive/negative 757:19 possibility 659:10 707:3 712:1 794:25 816:19 835:9 possible 700:11 730:22 738:18 775:11,14 817:15,19 possibly 738:16 756:24 796:4 post 663:20 postclean-up 676:12 postconception 688:5 699:3 postmenopausal 662:18 663:6,11 663:13,14,15 665:3,4 postnatal 700:12 705:22 post-labeling 747:5 753:8 potency 684:8 716:8 719:19,21 787:21 potent 695:24 827:7 potential 653:21 701:8 733:6 741:4 766:10 potentially 685:4 Potentiated 844:16 pounds 656:25 657:9 powerful 787:22 practically 759:22 practice 656:16 672:23 679:9,15	723:19 practices 824:11 pre 663:20 precancerous 786:12 precedent 793:10 precise 759:12 precisely 825:6 Preclinical 648:6 predict 732:8 predictor 831:19 predispose 701:9 Predisposition 647:12 pregnancies 659:11 661:22 808:8,16 pregnancy 658:21 659:9,12 661:24 665:9 685:10,11 686:2 691:3 697:11 705:12 pregnant 668:14 668:18 690:25 705:14 premenopausal 648:14 662:1,3,4 662:19 663:4,25 664:24 665:5 838:24,25 839:9 839:18 premium 729:6 prenatal 647:12 686:6 687:16,17 688:1,11,13 689:10,22 690:14 691:8 700:12 705:17 preparation 829:2 prescribe 726:8,8 prescribed 723:20 724:3,5,14,15,20 724:22 725:19 725:24 726:12 726:15,20,23 727:1,4 prescribing 724:10 724:11 prescription 725:7 prescriptions 723:22 prescriptive 725:3 presence 767:10,13 806:6 present 655:15 681:13,14 694:8 695:23 707:4 712:8 713:7,8 716:23 717:6,7
---	---	---	---	--	--

761:20 770:24 795:11,12 796:10 803:20 811:19 presentation 675:7 presented 675:5,8 733:21 presenting 819:21 preserved 743:17 preserving 743:2 president 824:24 pressed 827:1 pressure 660:3 784:18 presumably 651:6 794:21 presume 778:18 presumed 811:19 pretty 700:20 702:14 728:8 769:1 790:16 797:25 801:7 833:25 prevalence 766:16 prevent 700:21 prevention 756:1 791:12 prevents 684:1 previous 771:22 772:21 832:15 832:19 previously 650:10 659:3 796:21 primarily 704:5 731:6 primary 729:18 prime-DDE 809:25 principal 801:14 801:18 802:11 803:22 principally 846:17 PRINCOMP 801:22 prior 660:9 690:18 738:17 759:16 858:5 PRO 801:22 probably 651:4 653:1,2,5 655:10 666:23 681:24 682:7 683:9,10 691:11 699:21 707:5 717:11 720:2 727:6 747:14 763:25 768:25 774:21 776:4,5,9 777:22 790:16 792:8 793:3 796:7	797:12 808:25 832:2 833:15 836:18 843:2 851:8 problem 668:13 720:13 784:9 841:5 842:10,15 842:18 problems 732:23 741:1 procedure 674:4 679:9 743:3 771:6 procedures 742:6 proceedings 858:3 858:5,7 process 734:3 736:6 758:8 772:4 792:23 produce 696:3 702:11 830:13 830:18 produced 788:22 product 708:15 products 707:4,6 795:25 796:20 797:11 799:4 professional 673:17 679:5 742:17 professors 701:19 profound 697:15 program 673:23 project 672:16 674:10 677:1 678:13,16,21 679:3 680:6,18 689:6 proliferation 648:15 844:18 846:1 proliferative 688:12 prolongs 684:2 promoter 829:2 promoting 828:20 pronounce 776:11 810:6 850:19 properly 847:2 properties 809:21 proposition 696:6 729:21 730:13 prospective 815:11 prospectively 815:18 prostate 706:12 prostrate 813:4 Protection 692:24 protective 662:2	700:14,19 707:18 805:17 846:24 protein 687:4 protocol 729:4 protocols 729:3 prototype 687:6 provide 652:8 699:15 702:9 provided 801:24 providing 675:16 803:15 PRUDHOMME 646:3 670:8 681:13 698:10 738:20,25 740:13 765:18 849:14 pubescent 694:12 public 648:16 701:21 739:14 756:2 776:19 784:22,24 837:10 855:6 publish 819:22 published 652:18 689:7 749:15 755:1 756:13 757:2 759:17 784:3 785:7,10 819:25 851:25 854:12 publishing 701:18 pulling 692:16 pure 753:19 purified 625:13 purpose 661:1,12 675:6 695:4 713:25 715:20 732:18 733:6 738:8 742:6 purposes 716:7 736:23 743:10 put 663:24 675:21 697:20,22,23 698:21 743:7 754:24 768:24 768:25 769:2 792:8,9 802:7 677:17 P-e-c-o-r-a-r-o P-E-R-E-R-A 747:15 P-L-I-S-K-O-V-A 843:12 p.m 645:18 649:2 P32 747:5 753:8 P450 648:4 P53 844:13	Q qualifications 673:18 742:16 qualitatively 824:13 quality 717:3 quantification 768:10 794:17 quantified 820:24 quantifies 773:8 776:1 quantify 754:22 791:10 quantitate 681:6 quantitative 714:24 843:7 847:14 quantities 713:8 quartile 770:7 Quebec 771:18 question 661:12 671:24 683:24 685:7,23 692:5 692:22 702:1 706:2 710:22 711:23 713:2,4 715:4 718:7 719:23 721:8 723:7 751:7 767:22 769:9 774:11 775:18 775:20 796:3 807:9,11 817:25 830:16 855:4 questionnaire 658:13 659:5 660:5 734:8 741:13 questions 672:6 689:13 690:8,19 692:9 695:1,3 704:3 715:14 718:8 quick 746:2 quickly 747:12, 819:22 quintile 801:7 quintiles 800:22 quite 668:2 681:23 692:12 700:24 703:3 708:8 717:5,11,20 719:12 743:3 746:4 751:25 826:9,10 828:5 828:17 829:16 839:10 841:11 quits 849:10	R race 666:13 762:21 779:6 radiation 828:19 radically 751:22 Railroad 646:11 rainwear 707:9 raised 665:21 704:6 711:25 794:25 819:1 random 734:1 randomly 732:20 732:25 740:22 761:9 771:18 Randy 750:7 range 649:17,21 650:1 652:19 657:17,24 658:19 682:4 727:14 734:13 734:22 738:2 751:3,6 825:22 853:15 ranges 761:14 ranks 671:10,18 672:1 rapid 652:3 rare 664:19 798:1 798:2 rat 647:13 683:25 685:10 688:6 691:25 698:16 723:3 rate 649:12,18 652:8 669:23 670:3,4,24 671:7 671:21 728:5 730:10 737:24 759:22 761:13 761:16 776:25 795:4 839:10 842:15 851:3,5 855:23 rates 647:17 649:17 669:3,14 669:22 670:11 670:20,23 671:22 776:19 778:9,18 780:1 842:7,17 851:25 ratio 768:18,20 775:4 796:23 798:14 800:21 801:3 820:20 821:16 ratios 647:19 841:1 842:2 Ratliff 750:9 rats 685:9 686:2	688:4,8,13,14 698:17 703:10 723:1,5,10 737:11,18,19,22 rat-feeding 698:18 reach 714:14 841:2 841:6 reached 743:24 804:13 reactive 786:23,24 read 655:22 661:13 662:5 668:11 689:14 712:5,5 732:16 740:21 754:23 766:25 789:17 837:4 855:11 857:8 readily 832:10 reading 662:12 671:1 675:17 808:12 827:23 842:11 reads 693:5 real 710:20 716:11 725:16 734:18 800:16 really 680:7 703:3 703:25 749:25 759:8 773:9 774:12 794:12 802:9 806:19 818:12,18,25 820:1 823:13 835:20,20 837:7 841:7 855:7,12 reanalyze 784:19 reanalyzed 783:16 reason 650:20 695:24 702:7 743:18 744:8 784:5 793:7 805:24 818:14 844:21 reasonable 660:13 reasons 651:1 699:25 701:3 703:4 714:20 718:12,13 730:15 807:22 849:4 recall 719:14 724:10,11 receive 674:11 676:5,15 received 675:18 receptor 687:5 693:25 694:5,7 694:16,20,23,25
---	--	--	---	---	---

839:25 846:6,9 846:11,19,19,25 receptors 695:16 recess 703:18 740:14 795:15 recollection 671:23 671:25 recommend 701:1 725:9,11 recommended 725:2 recommends 768:8 record 649:9 655:22 687:20 738:20 781:25 858:7 recorded 657:25 825:18,19 recruited 771:15 recurrence 831:6 831:16,20 832:4 832:6,23 833:19 833:25 834:9,10 834:14 recurrent 831:23 redistribution 792:22 reduce 652:5 661:23 684:7 744:12,16 774:8 824:12 reduced 652:23 662:21 665:15 684:1 716:14 721:19 787:8 817:1 reduces 684:2 Reduction 675:2 675:15 787:6 reference 652:8 659:2 671:17 685:25 694:2,3 715:16 719:11 733:23 737:20 764:1,8,21,23,25 785:21 799:12 806:23 818:5 819:7,8 822:1 838:6 referenced 795:20 references 661:8 763:19 764:11 765:3,5,6 810:6 811:14,15 814:5 819:5 827:10 830:21 835:23 843:9 referencing 720:10 referents 842:8	referred 837:25 848:7 referring 688:3,7 740:16 784:10 refers 762:21,22 854:11 reflect 762:12 763:12 reflected 652:5 reflects 763:17 812:10 refresh 681:18 refusal 761:12,16 regard 847:15 regarded 846:16 regarding 713:21 724:3 770:11 region 728:4 771:20 850:25 851:5 regional 745:5 registration 739:24 regression 768:19 803:3,8 regular 678:7 754:20 regulate 847:2 regulatory 782:10 852:22 reject 784:11 relate 762:15,16 821:20 831:21 842:22 related 686:25 727:24 728:9 798:6 801:4 803:23 807:20 838:1,3 846:11 relates 762:18 relation 790:7 836:24 relationship 766:5 788:2 842:25 relationships 773:15 relative 661:23,25 663:4,7,9,12,17 664:1,8,9,14,18 665:23 693:8,10 693:11,12 698:3 768:16 778:14 778:20,21,24 779:7,13,20,22 780:5 787:23 793:25 794:4 798:10 800:5 801:3,4,5 820:18 830:7 832:22,24	832:25 833:8 858:12 relatively 709:14 834:20 841:23 relatives 703:22 release 670:22 relevance 780:7 796:2 847:6 relevant 745:23 746:12 787:21 788:6 807:23 811:3 817:18 818:1 831:24 837:22 849:5 reliable 744:7 791:5,6 relied 713:19 religion 662:24 relying 654:15 738:5,9 remains 666:6 remarkable 703:3 remember 649:9 660:8 661:6 667:20,21 671:20,21 678:5 681:16 683:8 702:15 716:2 723:2,6,9 724:2 724:4 733:14 741:24 742:20 756:11 760:24 763:22 764:22 768:23 remembered 723:25 remove 835:5 removed 787:12 821:6 Ren 673:4,6,17 rendering 700:14 rented 741:24 repair 717:25 729:25 758:9 789:1,3 repeat 653:10 repeating 837:7 repellant 739:25 replacement 661:1 669:1 684:25 818:20 report 659:1,4 673:21 696:5 699:6 704:13 705:1 732:13 735:8 738:21 740:17 753:24 754:12 761:6,20 763:9 764:21,22	772:25 795:20 796:13 810:18 854:12 reported 644:22 796:21 reporter 645:19 655:16,18,21 675:11 687:12 696:19 698:12 712:19,22 729:10 765:17 769:18 776:15 782:18,785:18 789:25 795:17 799:21 807:4 810:14 814:13 818:9 819:14 822:7 827:17 831:1 836:3 838:20 843:16 849:21 858:2 reports 759:22 represent 762:8 represented 832:13 request 741:20 require 675:25 required 694:7 696:3 814:1 rereview 667:22 Rescue 675:2 677:1 research 669:9 671:24 672:15 672:15 686:19 689:6 692:19 693:3,4 702:5 746:25 747:1 768:9 researcher 820:17 residence 733:1 735:4 resident 727:7 residents 650:11 732:20 733:6 740:23 748:5 828:24,24 Residues 790:6 resistent 680:22,24 resources 736:2 respect 684:15 781:14 811:1 819:4 821:21 855:3 respiratory 737:5 respond 832:7 response 688:8 690:8 718:18,20 718:22 730:9	738:1 786:18 789:1,9 842:7,15 842:17 846:21 responses 687:3 responsive 680:25 rest 671:15 725:16 735:21 780:25 851:6 restaurant 704:11 result 714:4 730:3 732:8 775:22 788:22 797:16 808:5,13 820:22 835:12 resulted 823:1 resulting 688:13 767:23 803:16 results 743:19 744:7 761:7,17 766:10 767:19 768:3 770:8,10 773:18 802:21 803:5,19 805:16 809:18 832:13 832:13 834:24 842:4,13 845:21 retardant 708:14 retracts 783:24 retrospective 822:16 return 769:7 Revich 849:11,16 849:17,23,25 850:4,16 852:1 853:19 855:23 review 661:8,10 672:14,24,24,25 686:20 687:21 689:3,4 693:15 745:17,24 797:20 810:16 819:2 823:23 828:3,13 829:12 830:9 836:7 reviewed 667:8 683:24 837:14 reviewers 819:23 reviews 810:25 827:22 828:9 Reynold 673:9 Rich 661:9,9,14 Richfield 779:18 779:25 780:20 rid 758:9 770:19 784:19 RIDDICK 646:12 ridiculous 783:3 784:2,3 Rifanpin 723:20	723:22 724:3 right 658:7 664:12 665:1,13 666:13 668:1 675:4 679:24 681:6 684:17 686:17 686:20 688:23 689:3 690:9 691:4 693:11 696:22 697:21 698:14,15,23 699:1 700:17 702:9 706:4 712:18 718:7 723:11 724:20 725:4 733:25 734:2 736:24 738:8,18,19 740:10,11 741:5 744:3 745:16 746:2,14 747:14 748:10 752:10 753:23 754:18 758:25 760:9,12 761:1,22,23 764:5,11,12,14 764:16,17 765:15 766:17 766:22 767:11 767:12,16 768:14 769:6,11 773:6,13 774:16 777:5,9,24 778:1 778:6,9,10,16,25 780:13 781:16 782:3,8,15,22 783:4,8,19,25 785:22,25 787:12,16 788:10,18 790:3 792:13 794:8,14 795:9,25 798:10 799:19,25 800:13,18 801:13 802:14 804:3,8,9 805:20 805:21 806:24 807:21 808:4,14 808:21 810:2,16 811:10 812:4,5 813:16 814:6,15 814:18 815:23 816:22 817:5,6 818:13 819:9,10 819:16 820:1,5 821:3,12,18 822:1,13,23 823:6,10,11,17 823:20,20
---	--	--	---	---	---

824:25 825:4,23 826:16,24,25 827:12 828:15 829:4 831:7,9 832:17,21 835:24 836:5,7 836:20 837:2,7 837:11 838:6,11 839:2 840:10,19 841:15,18 842:16 843:8,10 846:6,24 847:22 847:25 849:2,12 849:17,23 850:1 850:7,16 852:7 853:8,25 854:4 854:19 855:23 856:1 right-hand 842:14 845:3 846:14 rise 712:3 801:25 risk 647:22,24 648:4,14 654:19 655:4 661:5,7,9 661:10,13,18,23 661:25,25 662:7 662:17,17,18,21 663:4,9,12,17 664:1,4,7,8,10,14 664:18 665:5,9 665:17,19,23,25 666:3,12,14,22 668:20,23 669:1 669:20 671:5 681:7,12 682:5,8 682:10,17,21 683:3,9,12,15 684:15,16 685:1 685:12,14,16 689:10 690:13 691:20 693:8,10 693:11 698:3 699:25 700:23 700:25,25 703:4 705:18 714:3,6,7 714:15,16,21,24 715:1,2,5,6,9,13 715:15 716:12 716:21,22 718:17 719:2 720:9,18,20 721:6,7,13,15,17 722:16,20 724:3 728:4,7,14 730:11 738:10 748:19,21 758:19,23 759:1 759:11,14 766:6 766:10 767:9,14	767:23 768:16 769:22 770:2,3,9 770:24 771:10 773:1 774:8,24 775:1,3,8,23,25 776:1 778:14,20 778:21,24 779:7 779:13,22 781:20 787:23 794:1,4,10,13,15 794:21 796:12 796:18 797:6 798:10 799:19 800:5,7 801:3,4 801:5,5,5 802:18 802:23 803:14 803:23 804:2,7 804:17,21 805:5 805:8,11,13,18 805:19,24 806:2 806:14,21 807:9 808:6,21,23,24 809:3,11,22 810:1 812:11,13 814:1 815:17,22 816:4,15 817:17 818:14,16 820:4 820:12,18,23 822:25 824:5 830:7 831:23 832:2,22,24,25 833:8,13 835:6 836:17,18 837:2 837:20 838:25 839:18,20 841:14 850:21 852:2 risks 665:15 693:12 759:6,25 779:20 780:5 Rita 677:20 680:3 680:5 roadway 745:2,4 rodents 694:12 role 648:10 694:20 786:22 room 674:15 736:22 root 678:1,3 707:5 Root's 679:9,15 routine 817:11 Rude 678:2 run 680:16 704:19 running 684:16 825:8 runs 679:25 rural 744:24,25 745:13,17 746:1 747:8,25 748:5	749:13 771:20 Russia 648:17 850:1,3,25 851:6 Russian 855:8,11 R-E-F-E-R-E-N-... 842:8 R-e-n 673:8 R-e-y-n-o-l-d 673:9 R-i-f-a-n-p-i-n 723:20 R-o-o-t 678:3 S Sacramento 679:9 679:16,18 680:15 safe 651:21 714:22 716:13 719:8 720:24 782:11 salmon 668:2 795:8,11 Samara 713:20 sample 817:12 sampled 705:8 samples 743:17,22 808:2,3 855:14 sampling 713:6 743:19 808:4 Santa 644:16 645:17 649:1 668:5,10 SAS 801:22 sauna 674:15 save 762:6 saw 792:15 Sawyer 654:10,15 660:10 704:2,4 713:19,20,22 714:1,3 715:7,14 719:17 720:4 824:19 825:16 Sawyer's 704:13 705:1 saying 670:16 692:20 718:24 774:2 776:1 784:21 803:21 846:6 849:4 says 663:25 665:11 665:14 668:12 669:9 687:13 689:15 700:11 767:18 771:12 772:22 774:5 775:25 779:2,14 779:24 804:5 809:2 818:20 829:5 842:4	845:4 846:15 855:1 Schecter 708:14 709:19 711:23 Schmidt 673:4,6 756:23 Schmidt's 673:17 science 679:11 684:12 701:14 715:18 716:16 731:24 837:17 scientific 718:13 739:13 792:3 scientists 708:17 712:3 793:16 score 801:4,10,11 801:12 803:23 scored 801:11 scores 801:24 screen 661:13 screened 736:23 screening 786:10 screwing 835:1 se 807:18 searching 672:7 second 755:21 761:6 771:17 831:18 844:4 secondary 729:18 secondhand 666:10 748:17 section 686:22 687:17 699:5 755:14 764:23 804:14 805:15 808:5,13 securing 675:7 see 656:24 657:3,8 657:9,21 660:11 664:6 669:9 671:13 674:20 681:16 685:22 686:22 687:9,13 688:10,15,15 693:12 700:6 710:15 711:2 719:16,22 720:3 721:11 723:7 731:19 732:6,11 736:8 737:16,21 738:12 745:16 745:20 747:3,11 749:8 750:4 752:1 757:7,9 762:2 763:22 764:8,15 768:23 771:14 772:2,13 773:12,23 775:5 775:15 776:1	777:20 778:16 778:17 779:24 780:4 783:17 786:10 787:14 789:17 790:17 791:15 792:24 800:4 801:11 806:7,18 808:11 809:7 811:15 815:16 820:24 831:15 832:24 837:13 840:18 842:14 852:3,4 853:11 855:6 seeing 701:3 805:11 833:22 852:18 seen 680:23 681:4 712:1 731:11 759:3,8,13 768:2 784:20 785:5,7 788:9 808:22 825:12 840:4,5,5 840:6 sees 692:5 segment 752:23 selected 732:19,25 740:20,21 741:16,21 761:10 771:17 772:5 774:20 selection 735:2 829:1 send 743:5,6 817:11 sending 743:4 sends 742:8 sense 716:8 762:23 765:7 800:4 802:25 828:8 831:25 sensitive 803:5 813:10 sensitivity 714:18 758:13 sentence 662:11 712:6 763:10 779:11 separate 721:24 743:7 September 658:5,6 series 667:6 773:14 serum 709:24 713:11 743:6 766:6,6,20 774:17 807:24 808:4 serum-starved 845:14	served 677:4 service 739:14 session 675:4 848:25 set 743:14 782:2,10 782:13 858:4 setting 654:23 655:17 685:14 seven 652:17,21,24 759:10 773:4 795:21 822:22 shaded 670:9,10 sham 674:12 sheet 749:24 Sherrie 654:4,14 656:21 681:6,11 681:19,21 683:2 683:6,13 690:12 690:20 692:3 703:21,23 704:9 704:12,25 705:25 713:14 713:16 715:8 750:9 765:2,6 781:14 796:2 798:7 807:21 811:3 817:7,10 821:21 831:21 832:5 837:22 842:23 847:7 Sherrie's 704:7 Sherry 731:16,25 ship 743:8 shipment 743:2 short 648:7 711:24 751:17 819:18 819:23 shorter 652:13 753:4,6 shorthand 645:19 858:1,8 show 722:4 730:8 738:10 747:10 755:8 761:7,10 761:24 763:2 789:8 792:16 796:24 806:10 833:11 838:18 showed 683:25 707:19 713:9 761:22 771:21 797:20 showing 717:11 744:3 794:6 831:22 832:15 shown 666:18 670:13 715:24 716:25 717:5 722:23 749:11
--	---	---	--	---	---

749:17 755:11 845:18 shows 697:15 787:21 788:14 800:5 805:23 837:25 848:12 851:4 shy 658:8 sic 702:21 sick 712:4 724:19 826:22 side 685:8 748:15 748:18 842:14 sign 668:11 signals 753:17 significance 780:8 798:16 804:13 819:19 833:9 835:21 839:21 840:25 841:3,6 841:24 842:1 significant 663:6 664:9,22 665:20 699:9 706:11 713:8,24 715:19 716:17 721:1 747:23 768:21 780:10,22,24,25 781:1,2 783:1 788:1 800:9,11 800:12,15,15 801:6 805:23 811:9,23 812:1 812:16,20 813:8 813:9,18,20 823:12,16 824:4 829:7 833:6,7 834:4 835:17,19 839:18 840:14 840:23 841:8 significantly 652:4 670:3 715:8 717:5 757:20 766:7,16 767:8 769:25 790:25 800:20 811:21 812:21 820:11 833:1 837:21 signify 792:22 signs 668:7,9 Sigurdson 783:18 Silesia 756:9 similar 665:18 687:1 704:17 709:3,6 710:12 710:16 714:2 718:10 731:23 745:11 791:8 797:8 801:4	821:23 845:2 846:2,5 similarities 797:5 similarly 674:19 813:4 simply 660:7 794:6 794:20 849:4 single 685:10 699:2 716:6 759:15,18 767:13 795:1 806:16 852:23 sir 849:24 sister 682:15 sisters 660:17 682:15 683:2,4,7 683:13 690:17 sit 672:23 674:5,15 676:25 677:8,10 677:12,15,17 site 696:5 743:14 854:2 sites 671:19 sits 673:3 677:22 situated 674:19 six 669:21,23 851:14 852:15 854:13,15,24 855:18 size 694:18 745:11 787:8 sizeable 779:2 skilled 855:7 skin 729:14 786:5 skip 672:5 slight 745:13 748:5 749:7,11 809:2 slightly 713:12 749:16 800:12 800:14 803:17 slope 715:16 716:2 716:5 718:15,23 720:11,15 721:24 722:3 738:7 759:17,24 806:22 slower 652:20 653:13 slowly 701:15 smack 658:18 small 664:23 752:23 796:22 804:18 805:13 805:23 813:7 834:14 840:24 841:7,22,23 Smith 679:22 smoke 666:10,11 748:15,17,18 749:1 776:9	786:15 smoker 730:11 750:2,4,10 smokers 749:9,10 749:17 751:24 756:8 764:14,15 764:15 smoking 666:5 748:12 749:3,5,6 749:14,22 750:11,15 751:24 790:20 SMR 811:24 823:3 823:15 SMRs 811:19 SMSA 779:19,25 780:21 society 728:12 soil 731:19 851:11 853:22 soils 650:17 757:4 757:9 somebody 711:25 someone's 748:9 748:13 somewhat 666:6 716:6 721:13 sorry 653:7 655:16 662:10 670:19 702:13 712:19 717:17 732:14 748:22 800:24 803:7 808:9 830:16 831:13 832:14 838:25 848:15 sort 674:12 679:5 684:15 745:7 772:18 815:11 828:15 sorts 835:2 sound 724:9 soup 712:25 source 651:7 653:24,25 655:5 667:3,24 750:16 755:4 756:7,12 sources 653:21,23 748:8 South 704:23 so-called 691:16 715:1 721:25 774:22 Spain 821:2 speaker 768:5 speaking 748:4 speaks 699:11 special 743:8 species 786:24	specific 687:3 688:21 724:2 742:5 753:9,10 753:19,21 754:7 773:11 791:16 791:21 792:7,12 793:4,5 799:2 820:2 837:6 844:17 specifically 653:22 654:11 656:21 660:5,9 672:3 688:3,7 714:5,12 715:25 753:13 764:21 844:3 specificity 753:21 spectrum 687:2 774:6 speculation 692:13 spell 662:21 725:20 726:13 spend 835:8,11 spending 693:6 sperm 691:18,19 spike 751:22 spin 743:6,7 sport 667:15,25 668:5 Spous 757:1 spread 812:14 Springs 706:21 squared 657:4,14 St 777:2,4,8 779:6 779:15,18,19,24 780:3,12,20,21 785:11 stable 744:5 803:12 stack 669:25 staff 649:15,17,18 Stage 689:23 stain 707:10,12,15 staining 845:6 stand 696:10 standard 674:4 771:6 780:2 803:16,17 804:4 808:18 825:10 stands 834:3 start 736:7 833:22 852:18 853:23 started 659:18 691:8 773:12 829:22 835:18 starting 808:13 833:3 842:12 state 669:13,22 670:1,3,4,5 671:21 732:16	740:20 753:23 754:12 761:9 763:10 779:25 782:4 857:16 858:2 stated 689:9 699:20 703:11 716:24 statement 696:10 696:13 699:10 699:11,18 730:24 773:2,3 773:19,21 774:9 793:1 803:25 states 644:1 645:1 670:13,16,24 671:10,18 672:2 694:6 699:6,14 708:22 728:7 744:20 767:6 772:21 777:14 779:1 782:3 788:9 795:2 797:5 809:18 815:19 828:23 844:3 state-wide 669:16 669:17 statistical 780:2,8 798:16 802:4,10 802:15 804:12 804:13 806:17 833:9 835:21 839:21 840:24 841:3,6,24 842:1 statistically 663:6 664:9,22 665:20 768:20 780:21 780:23,25 781:1 781:2 788:1 790:25 800:20 801:6 811:9,21 811:23 812:1,15 812:20 813:8,9 813:17,20 823:15 833:6 834:4 840:23 841:8 statistician 802:8 statistics 802:8 804:22 status 676:20,23 stayed 657:24 664:22 stick 707:13 stimulate 695:16 846:1 stimulated 845:12 846:9	Stimulating 846:25 stir 794:24 stock 820:17 stomach 697:23 stood 763:6 stopped 651:24 652:10 659:18 659:19 736:14 736:18 751:24 stops 652:22 straight 855:10 strains 680:21 681:2 Strasse 685:24 688:24 696:16 696:21,24 697:18 698:2 702:22 Strasser 702:21 stream 748:15 752:24 stream/secondha... 748:18 Street 646:4,13 strike 665:24 682:25 705:1 707:25 711:20 722:14,18 725:2 728:19 741:11 743:16 817:2 821:19 825:15 striking 706:13 strikingly 758:6 strong 727:24 835:21 845:17 stronger 788:14 strongly 805:1 structurally 686:25 structure 816:21 studied 655:1 661:17 667:21 674:9 708:14 756:8,9,10,10 766:13 801:9 851:14 studies 652:18 663:22 666:8,18 667:6,9 672:1 680:20 681:1,4 683:17,20,25 686:1 689:15,16 691:21 692:11 692:13 693:5 698:5 699:12,15 700:2 701:4 705:16,20,21 707:19,23 709:3 715:22 716:6
--	---	---	--	--	---

717:1,14 722:4 722:23 723:1,1,3 728:1 730:8 732:4 738:4,7,10 739:5,6,8,9,15 745:25 749:11 749:17 750:14 751:24 752:8,15 755:10 757:3 770:25 771:6 772:21,22 773:4 773:10,14,24 774:1 775:16,18 777:17,23 791:21 792:1 796:24 797:19 805:3 809:10 810:19,23,24,25 811:5 815:20 816:18 817:10 817:13,18 820:15 829:13 829:13,14,15,16 829:20,23 848:7 848:8 study 648:5 662:2 666:2,9 667:10 674:2,5,6 684:5 684:10,11,13 685:8,17,21 688:6 692:22 693:13,14 696:24 697:2,4 697:10,25 698:14,16,18,25 700:4 702:19 705:5 723:8 737:9,11 739:13 742:24 744:18 746:3,17 756:2 759:21 760:4 763:21 771:13 772:7,17,19,20 776:8,8 777:2 777:23 781:18 787:1,17 788:9 789:16 790:9,13 790:14 791:1 794:3,5,24 796:11,22 797:2 797:24 798:12 799:1,9,13,16,17 806:3,4,12 807:15,19 809:9 810:3,5 811:18 814:18,21,23,25 815:1,4,11,14 817:2,25 818:2 820:16 821:2	822:12,16 823:23,25 824:2 829:19 831:20 834:20 835:16 835:20,22,23 836:5,20 837:22 839:4 840:5,6 841:7,10 842:16 842:20,20 843:4 843:5,8 844:6,7 847:13 848:2,10 850:4 851:20,23 studying 667:10,12 806:6 844:8 849:2,3 stuff 707:20 708:23 751:19 852:6 stupid 711:2 style 739:19 subgroup 816:15 subject 717:15 718:9 726:9 732:19 740:21 747:15 769:8 799:9 824:18 838:11 subjects 732:25 740:18,20 766:8 submit 843:2 subpoenas 693:22 subscribed 858:15 subsequent 793:2 793:4 subsequently 829:23 substitution 687:1 subtracted 763:2 sufficient 721:9 767:21 suggest 709:3 766:10 770:8 805:6,16 809:23 suggested 700:8 802:21 849:7 suggesting 694:19 786:19 804:21 832:1,7 suggests 832:9 849:6 Sulfisoxazole 726:14 sum 772:23 Sumara 850:25 851:7 summarize 670:25 summarized 705:1 summary 689:6 summation 792:14	summer 746:11,19 746:22 supplies 777:19 supply 825:14 848:17,24 support 699:15 739:6,10 764:10 793:11,14 796:8 809:18 836:23 845:21 supportive 812:3 812:24 823:23 supports 696:12 suppose 740:8 743:20 suppressor 844:14 suppressed 694:18 suppression 846:20 sure 654:15 668:13 673:24 681:23 690:7 695:3 701:6 702:2 706:15 734:3,22 741:17,17 756:25 759:24 768:3 769:1 775:16,24 797:23 798:23 834:22 849:14 surprising 789:8 surrogate 840:17 surveys 736:19,20 susceptibility 717:24 718:3 730:5 747:20 770:14 836:15 susceptible 700:3 816:9 susceptibility 689:24 suspect 701:17 826:9 suspected 684:25 708:19 sworn 649:5 symptomatic 675:25 symptoms 676:23 synergistic 722:10 722:13 848:10 849:2,3 synthesis 789:4 synthetic 656:8 686:7 system 704:24 709:4 847:16 S-phase 844:14 845:10 S-t-r-a-s-s-e	685:24 S-u-l-f-i-s-o-x-a-... 726:14 T table 665:12 710:8 710:13 737:15 747:2,3,5 757:15 761:6,20 762:1,8 762:10,11,15,20 767:18 768:19 768:25 769:4 772:5 774:19 779:14 780:18 800:5,21,24,25 801:8 803:23,24 808:14 811:12 811:13 812:5 813:16,17 818:18,18 819:7 819:21 823:8 832:24 837:9 851:1,14 854:22 855:1,17 tables 746:1 761:25 tagging 653:8 take 653:2 676:6 703:15 711:3 721:19 725:9,12 731:24 732:4 742:25 762:6 787:8,10 795:14 817:12 826:21 826:21 836:15 837:12 taken 645:16 654:10 668:9 676:3 732:18 736:22 787:3,4 812:23 823:22 855:14 858:3 takes 701:20 752:2 837:18 talk 656:21 664:6 686:9 693:24 696:16 703:22 705:21 730:22 734:8 743:21 744:18 750:22 754:5 759:4 772:13 782:22 818:16 828:1,4 844:12 845:1 talked 684:14 694:3 703:21 713:13 728:17 734:17 745:1 747:24 756:19	774:10 795:9 827:5 844:23 talking 650:23 654:3 667:9,24 670:8 672:21 686:5 693:16 695:5 700:16 702:6 714:21 732:17 744:5 746:11 752:16 772:14 786:7 803:8 804:19 811:25 815:24 819:3 821:23 831:19 833:20 846:7,23 854:1 855:6 talks 669:5 686:21 686:22 688:22 689:15 694:5 695:7,7,8 772:21 788:4 795:23 796:17 818:18 827:25 829:18 837:5 tar 764:7 target 786:25 Tarkar 673:4,10 673:13,19 756:24 TCDD 647:12 652:16,25 653:5 683:18 684:1,5 685:10,15 686:2 687:7 688:2,4,11 688:13 689:10 695:8 697:15,17 698:5 700:13,21 701:8 702:3 770:5 786:13,14 788:7,12 789:8,9 807:15 811:19 818:17 823:13 823:14 824:10 825:8,9,13,17 827:6 845:1,8,11 845:19 846:3 848:3,6,7,10 850:7,8,11 TCDD-exposed 694:21 TCE 711:17 technicians 742:21 743:18 technique 731:23 732:12 753:8,9 753:20 759:4 773:7 791:3,4,15 791:18 792:14	792:15 techniques 747:6 826:11 TEF 768:23 769:10 Teflon 706:1,8 707:3 Teflon-coated 706:24 TEFs 711:21 722:2 769:4 Telephonic 655:13 667:14 tell 685:20 720:16 761:24 775:10 776:22 785:1 809:12 ten 757:19 798:15 798:24 800:6 826:6 854:19 tend 703:9 744:16 744:24 746:12 751:16,17 tendency 723:16 tends 809:9 TEQ 711:12,14 851:13,14,16 853:3,4,8,13,24 TEQs 711:19,19 750:22 775:25 850:12 852:14 term 686:23 723:13 844:19 terminal 688:12 terminally 760:9 760:10 terms 654:18 655:3 663:2 669:25 671:10,18 676:18,20 685:15 730:25 751:2 776:1 791:16 805:10 835:3 852:3 terribly 778:19 796:14 826:23 tertile 833:3,4,4,8 test 736:17 740:18 817:19 818:1 tested 762:25 802:19 Testes 813:5 testified 649:5 681:19 825:16 testifying 858:6 testimony 857:11 testing 741:2 742:7 761:8 806:7 825:9 textile-treating
---	---	--	--	---	---

707:11 Thank 660:22 739:1 theoretical 730:20 theoretically 730:22 731:22 theory 685:4 718:16 therapy 661:1 669:1 680:24,25 701:2 832:7 thereof 858:10 thing 698:21 709:14 711:3 751:3 784:3 804:24 817:11 820:20 851:9 things 693:6,17 701:20,21 707:7 716:11,12 717:1 726:2 754:6 774:14 787:22 792:6 797:15 804:23 819:1 835:3 839:16 843:19 848:21 think 650:16 651:18,25 655:7 655:19 656:1,25 657:3,20,24 659:14,24 661:8 661:16 663:21 663:22 665:24 666:10 669:8 670:8 671:14 674:13,18 676:21 681:11 681:23 682:10 683:4,8,13 685:17 690:9,10 690:12 691:14 692:2,12 695:24 698:19 699:19 699:19,20 701:5 701:14 702:15 702:24 707:8 709:20 713:3 714:2 715:21 716:20 717:20 719:11,21 720:2 720:23 721:6,10 722:12 723:15 723:17,21 724:7 733:15 734:12 734:16,21 735:9 735:9 741:18 743:21 745:4,16 747:10 748:2,4 754:10 755:21	756:6 760:1,15 760:25 761:18 763:1 764:2 766:4 769:6 772:18 773:3,24 774:1,20 775:10 775:12 778:5,17 779:11,25 780:15,17,18 788:6 790:23 792:6 793:2,8 796:7 800:7 801:3 803:21 804:21 805:22 806:15 808:19 816:7 819:5,21 820:14 823:3,21 823:24 824:13 826:15 831:15 833:14 836:14 837:17 840:11 840:22 844:21 848:6 850:18 851:1,13,24 852:4,12 853:9 853:12 854:9 thinking 731:18 732:10 thinks 829:7 third 783:6 thorough 828:13 thought 671:12 672:8 682:3 684:6 685:22 688:9 697:7 731:8 744:4 745:25 768:6 791:4 796:12 807:23 844:21 thread 684:16 three 668:19 704:9 705:7,10 735:3 735:16,18,24 752:24 753:1 759:10 770:4 780:4 804:9,10 834:1 851:15 852:15 854:3,7 854:13,16,18,23 855:2,16 threshold 702:20 715:3 716:20 718:9 thresholds 718:9 806:22 threw 785:4 throat 697:21 698:22 Thyroid 813:5	tighten 835:16 till 826:22 time 649:15,23 651:4 652:1,5,10 656:22 657:23 657:23 659:16 659:22,24 676:1 684:2 688:25 689:21 691:24 693:7 698:17 699:2 700:2 708:8 713:13 728:16 736:25 743:24 754:16 762:7 774:13,16 776:6 777:11 785:10 791:13 795:13 798:15 798:15,17,18,24 798:24,25 808:22 828:14 828:18 829:20 830:10 831:18 835:9,11,13 840:4 858:4 times 651:2 704:9 724:22 759:11 813:1 timing 685:14 699:22 701:5 tiny 668:11 tissue 714:11,12,13 714:14 716:23 717:7,8,17 752:14 761:3 786:3,4,25 787:4 787:4,9,11 790:12 792:20 793:7,13,16,19 793:19 808:2 817:12 821:5 tissues 694:10 714:15 752:16 787:10 title 686:15 755:23 785:24 790:5 799:7 854:25 tobacco 786:15 today 651:6 659:25 681:21 684:14 713:14 729:8,8 729:17 741:18 769:7 776:5 833:11 846:15 toes 793:18 told 676:9 691:3 740:7 784:1 820:16 Tony 738:20	top 801:6 820:10 828:10 topic 739:18 total 664:20 688:11 719:20 732:20,20 733:19 740:23 767:1 770:4 773:5 803:1 804:16 805:1 809:5,6,24,24 833:7 834:3,9 853:3,4,8,24 854:19 855:17 totally 708:5 730:15 totals 713:9 touches 829:15 towns 745:11 toxic 652:16 670:22 695:25 697:21 705:13 708:25 709:7 712:12 718:2 770:5 toxicities 845:2 toxicity 687:8 691:17 712:9 717:4 725:14 774:21 821:23 846:2,9,10 trade 820:17 transcribed 858:8 transcript 857:9 transcription 858:10 transform 816:25 transformation 770:12 transition 845:13 translated 855:11 treat 723:22 726:2 726:2 treated 651:3,7,12 651:14,17,24 652:11 674:23 675:24 707:20 708:1 treating 651:7 treatment 672:13 674:11,12,20 675:19 676:5,16 680:22 688:11 701:8 732:22 738:23 740:25 777:5 trend 662:8 663:5 663:17,19 757:7 trick 728:25 784:1	tried 674:13 734:22 785:12 825:2 835:5 tries 692:18 triggered 791:23 trouble 779:11 true 696:15 730:24 778:2 812:25 834:25 857:11 try 658:13 714:25 751:14 754:22 794:12 835:9 trying 661:6 689:20 701:20 733:13 736:5 741:24 743:20 760:24 768:7 785:6 806:19 807:9 811:15 812:19 846:8 847:8 tube 697:22 tuberculosis 723:23 Tuesday 644:17 645:18 649:1 tumor 717:8 831:25 832:8,9 840:3 844:13 tumors 686:8,9 687:18 696:3 840:2 turn 764:20 turned 821:16 turns 834:3 twice 704:6 772:17 813:1 two 664:18 680:2 682:15 704:9 714:9 733:3 734:9,13,14 735:7 738:4,7 742:13 752:2,19 752:24 753:1 758:24 759:7 761:25 766:21 783:14 796:24 804:10 806:6 826:13,17 838:13 843:19 846:3 847:23 848:4 849:7 twofold 779:7 two-and-a-third 759:11 Tylenol 725:5,12 type 692:10 697:7 716:25 751:3 753:3 800:7	840:3 types 695:6 752:19 754:11 757:21 758:15 760:16 787:18 811:22 832:10 846:10 typical 705:3 typo 767:25 U UDS 786:21 788:9 788:15 789:2 Ukraine 824:25 ultimately 730:19 Um-hmm 653:19 673:7 748:2 765:10 766:15 767:12,16 784:6 786:1 809:8 836:6 unavailable 754:15 unbelievable 784:13 unchanged 803:19 unclear 721:22 undergo 760:19 underlying 701:10 undersigned 858:1 understand 656:6 692:8,17 696:8 703:8 734:3 736:5 760:20 801:16 802:3 830:12 understanding 653:20 709:13 753:15,20 underwent 761:8 unduly 744:15 unheard:728:11 United 644:1 645:1 708:22 728:7 744:20 782:2 795:2 unknown 727:25 unmarried 808:23 unrelated 730:15 unscheduled 789:2 789:3,4 Unsolved 655:20 untreated 845:20 unusual 761:13 unwell 676:1 upper 666:18 UPSHAW 646:12 urban 744:23,24 745:12,17 746:1 747:8,25 748:5 749:13 771:20
--	---	---	---	--	---

Page 60

use 656:7 660:11 661:3 668:22,25 702:7,8 711:4 719:4 740:10 772:12 773:5 781:10 784:2 825:8 827:2 840:18 useful 813:22 usual 720:17 usually 655:2 682:7 701:19 702:5 703:24 722:2 759:4 761:14 773:25 774:1 825:7 uterine 686:9 utero 690:18,20,22 697:16 847:19 U.S 727:13 728:8 729:8,17	661:9 686:21 704:5 711:21 730:16 739:15 748:8 757:9 758:17 772:12 786:10 811:4 826:11 833:24 vary 662:17 754:3 Vegetable 704:4 vehicular 795:24 verbatim 858:6 versus 669:13 680:24 744:23 747:20 766:9 771:20 775:18 779:15,18,19 780:12,20,21 806:21 855:15 Victor 824:21,24 825:17,25 826:9 Vienna 825:24 826:3,18 827:3 view 720:20 813:11 Vioxx 725:15 viral 818:22 Virginia 706:21,22 visits 680:9 vitro 696:24 787:1 788:16 790:9 829:14 844:6,7 847:13,16,19 volatile 708:3 volatility 708:5 Volume 644:18 645:15 647:3 volumination 708:4 Vonder 688:23 696:16,21,24 697:18 698:2 702:22 Vorder 685:24 702:21 vs 644:7 645:7 770:7 V-o-r-d-e-r 685:24	739:9 744:9,12 746:4 749:14 758:5 761:19 764:20 774:12 793:23 802:16 816:11 817:17 819:22 850:4 wanted 736:18 737:1 warm 743:23 744:9 746:19 warnings 724:2 726:9 wasn't 664:9 672:13 702:19 713:7 755:22 809:13 829:20 waste 748:20 wasted 835:13 water 647:18 654:1 668:4 706:20 776:21 777:7,19 781:5,7 781:10,11,16,19 781:23 782:7 way 651:18 652:7 653:8 663:24,25 674:14,18 681:5 691:5 697:13 702:4 712:7 719:12 731:15 737:3 750:24 773:9 778:19 813:23 833:3,5 834:1 ways 707:22 weak 695:18 778:5 Webb 791:14 Webb-McCall 773:7 791:2 week 668:19 705:7 719:1 737:23 820:7 weeks 737:24 weight 657:3,8,21 657:22,25 790:20 808:10 808:17,20 Weinberg 677:20 680:3,5 wells 781:7 went 669:12 701:6 735:24,25 745:16 weren't 692:13,14 742:4 west 646:8 706:21 706:21 743:24 744:1	WESTERN 644:3 645:3 we've 674:22 721:20 wheels 701:14 WHEREOF 858:14 white 666:15 670:2 670:5,6,7,13,15 671:7 752:6,9,17 752:19 753:3 755:3,9,15 756:5 756:11 757:4,12 758:22 760:4,7 760:13,22 763:11 whites 669:17 671:4 834:12 wild 667:11 WILDMAN 646:7 William 704:7 783:21 WILLIAMS 646:12 willing 771:8 winter 746:11,13 746:20,22 WINTERS 646:13 682:3 wisdom 668:9 WITNESS 647:2 655:14,17,19 656:5 667:15 670:10 681:15 682:5 687:13 703:17 712:21 712:24 739:2 782:19 795:13 799:22 818:10 822:8 827:18 843:17 856:3 858:14 witnesses 858:5 Wolfson 660:10 704:2 woman 663:7,11 705:14 710:23 766:17 847:18 women 647:14 661:17 662:1,3,4 662:18,19 663:4 664:24 665:5 666:15,16,17,19 666:21 667:10 667:13 668:18 689:18 705:9 728:5,6 742:13 765:25 766:8 771:14,17 787:4	787:6 790:11 796:5,25 797:7 797:12,18 798:10 808:23 808:24 815:13 816:16,22 821:6 822:22 823:9 825:21 826:3,13 827:3 832:17 834:8 839:6,11 850:21 851:5 854:6,7,13,15,19 854:21 855:5,5 855:15,16,19,20 women's 796:6 wonder 664:17 wood 651:3,7,12 651:14,17,24 652:11 732:21 734:16 738:23 740:25 777:5 Woodworth 677:22 680:11 680:17 words 670:21 690:5 736:15 749:4 753:11 798:22 805:2 842:13 852:14 work 649:13,23 654:9 655:2 674:1 680:7,17 689:7 696:7 750:1 826:19 worked 654:6 678:10,15,20 679:2 680:5,14 738:22 760:2 822:22 854:11 worker 758:4 workers 648:8 655:1 675:2 677:1 730:8 756:8 757:22 758:4 763:20 813:14 822:13 822:18 853:23 853:24,24 854:1 854:6,10,18 855:1,2,17 working 650:2 654:13 701:17 701:24 756:18 826:12 world 716:11 worries 784:4 worry 782:24 worth 813:12 wouldn't 652:3	702:7 711:3 720:10 721:2 745:10 749:25 763:5,6 808:19 847:13 write 657:8 819:20 writer 855:7 writes 778:19 writing 756:17 written 658:15 729:17 747:14 791:24 838:10 wrong 689:21 690:10 699:19 760:22 765:3 792:2 815:7 824:1 wrote 723:21 W-e-i-n-b-e-r-g 677:20
V					X
vaginal 686:8 validate 792:8 value 713:9 750:6 750:7,24 759:9 759:10 763:4,5,7 779:17 780:7,11 827:23 835:19 847:14 851:18 852:23 853:17 853:19,21 values 665:3 667:21 676:8 744:17 745:3 759:5,6 782:10 800:8 834:11 851:16,19 853:9 853:12,22 vapor 708:9 variability 750:23 variable 652:13 839:11 variables 801:25 802:5,6 variant 816:16 817:14 variation 751:6,10 751:11 797:8 837:6 variations 744:19 744:22 varies 649:19 752:22 variety 714:20 716:11 various 651:1 652:12 656:15				X 732:9 xenobiotic 757:11	
					Y
					Yea 849:18 yeah 654:3 673:24 687:25 699:11 708:20 710:3,24 712:25 713:20 716:19 720:4 724:22 725:6 726:7 729:3 732:3 744:1 749:6 750:20 762:5 764:24 766:25 772:8 775:24 780:14 789:2,19 790:15 795:7 799:5 802:4 812:17 816:2 818:10 825:13 833:14 843:21 851:23 853:17,20 854:1 854:22 855:4,19 855:25,25 year 658:9 678:6 725:15 727:13 755:20 years 650:3 651:10 651:12,13,16 652:17,21,24 653:2 662:24 676:11 680:2 705:6 709:17 723:21 733:1,2 734:11,12 735:4

742:15 744:6 752:24 777:12 795:5 798:15,17 798:24 825:21 826:6 835:16 855:16 yesterday 672:7 674:13 685:17 694:24 695:19 696:1 702:6 703:5 711:1 716:10 734:17 744:5 745:1,11 756:19 815:2 817:9 840:1 yield 700:13 yielded 773:17 York 672:5,12 673:23 674:10 677:1 678:6 680:10 710:4,13 710:13 831:7 young 847:18,19 younger 683:8 Yup 703:1 Yushchenko 824:22,24 825:25 826:10 826:13,16 Yushchenko's 825:17	778:20 779:5,9 1.6 665:17 850:22 1.63 766:9 1.7 665:21 833:4 1.8 665:23 671:7 768:20 1.9 663:10 665:17 1/2 813:1 10 644:17 645:18 649:1 709:17 737:24 751:4 758:21,22 761:14 841:25 842:1 10,000 718:25 10.85 779:18,21 100ths 811:25 100,000 669:15 671:8,8 718:25 720:15 10034 644:23 645:19 858:20 101 766:20 103 732:20 733:6 733:13,17,21 734:5 740:23 741:2,12,15,20 105 737:23 770:5 11 664:10 665:6,6 814:8 841:25 116 696:5 118 770:1,2,5 775:7 820:10 12 653:2 658:15,16 662:24 664:8,10 665:6 676:13 818:6 1200 676:7 1242 791:8 1260 791:8,12 127 647:9 675:10 675:14 128 647:10 687:10 687:11,21 689:2 129 647:11 696:17 696:18 834:5 13 664:17 665:6 772:20 819:9 841:25 851:14 13.64 779:19 13.65 779:21 130 647:12 698:8 698:11 765:12 131 647:14 765:15 765:16,18,19,22 132 647:15 769:16 769:17 133 647:17 776:13 776:14,18 783:9	134 647:19 782:15 782:17 783:9,10 783:10 135 647:20 785:16 785:17 136 647:21 789:23 789:24 137 647:22 795:16 795:19 138 647:23 767:1 799:16,20 139 647:24 807:2,3 14 664:17 665:6 855:14,17 140 648:3 810:11 810:13 141 648:4 814:11 814:12 142 648:6 818:5,8 143 648:7 819:12 819:13 144 648:8 822:4,6 145 648:10 792:20 827:14,16 146 648:11 830:24 830:25 832:14 147 648:13 836:1,2 1477 834:19 148 648:14 838:18 838:19 149 648:15 843:13 843:15,25 15 657:7 664:18,21 665:7 688:5 699:2 709:17,22 727:23 761:14 827:10 150 648:16 849:19 849:20 153 766:7 767:1,8 768:19,22 769:10 775:8,18 156 770:1,2,5 775:7,19 800:9 158 770:18 16 830:21 841:20 841:25 160,000 727:14 1625 699:6 1628 699:14 17 761:12,16 170 811:14 1700 645:16 174 812:10 179 766:14,24 767:5 18 682:2 180 766:20 767:17 800:12,14	804:12,25 1818 808:13 809:1 183 800:11,17 804:13,25 19 841:20 190 656:25 657:25 1961 681:20 1970's 777:11 1971 779:4 1973 709:24 713:11 1983 661:16 1986 764:4 1988 785:10,12 1990 747:24 764:10,12,13 1990's 772:22 1991 739:25 1992 737:14 1996 669:15 1997 657:7,9 1998 745:24 746:25 765:9 850:25 1999 838:8,22	747:18 755:22 755:24 2002 738:14,17 769:13 2003 686:6,13 2004 711:4 2005 644:17 645:18 649:1 201-2537 646:9 202 657:9 2153 800:8 219 771:15 22 659:6,6 220 842:3,12 225 646:8 23 659:7,7 230 799:5 24 665:16 761:7 762:19,23,24 851:18 247 848:16 249 848:18 25 665:19,21 751:19 761:21 762:13 841:19 251 848:18 252 848:18 254 845:3 28 762:21 809:12 820:3,12,19 821:15 29 665:19 709:10 709:23 710:8 732:17 733:22 734:6 735:18,19 736:1,9,11,14 741:16,21,22 761:2,9,21 762:10,13,22,24	736:14 737:2,24 772:11 833:18 30's 658:1 300 833:21 305 732:14 740:17 307 771:17 309 646:13 31 764:13,17 312 646:9 314 772:5 315 771:14 337 646:5 34 659:3,20 711:11 853:8 35 658:3 659:3,7 729:20 772:11 841:19 35th 658:9 36 658:7,7,8 37 711:4 764:15 37-year-old 710:18 710:23 38935 646:14 39 710:25 392 687:19 694:6
Z zero 737:24 759:8 0 0.63 766:9 0.75 758:21 0.98 823:5,17 00 757:24 0005 779:17 001 779:18 021 804:5 05 780:9,12,14,15 780:16,24 835:20 1 1 665:3 732:25 737:15 772:5 780:15,16 818:18 833:4 835:19 851:2 1A1 648:4 1,185 661:17 1.2 663:10 1.3 796:23 833:4 1.4 664:8 1.5 663:9 778:17	2 2 733:1 750:10 762:10 772:20 772:20 774:4,19 778:10 800:5 803:24 813:1 818:18 822:20 823:1 824:3 825:5 851:2,3 2B 738:13,15,16 2.02 770:6 2.06 657:13 2.1 664:11 850:22 2.15 823:4,14 2.16 811:24 812:8 2.2 798:14 2.5 798:15 2.7 850:22 2.74 750:5 2.9 833:8 20 665:15,16,18 705:10 732:25 734:9 764:14,18 779:3,6 790:12 790:12 794:2,3 795:5 825:21 849:17 857:15 20th 657:9 200 664:20 200-pound 657:24 2000 737:9,13,14 737:16,21,22 740:2 747:7,18	3 3 710:8,13 747:3,5 761:20 762:8,11 762:15 767:18 768:19 788:10 800:21,24,25 801:8 803:23 822:20 823:1 824:4 825:5 3,227 661:18 3.38 779:15,21 3:03CV60-P-D 645:6 3:03C0V60-P-D 644:6 30 663:8,12,16,19 665:22 729:15 729:20,20 735:25 736:9,10	4 4 710:8 757:15 854:22 855:17 4.11 758:22,25 40 657:15,16 669:22 670:12 751:20 406 834:10 409 823:6 412 853:24 439-0707 646:5 44 758:3 45 657:15,16 455-1613 646:14 465 649:14 47 753:23 763:9,16 49 732:14 733:15 733:24 737:22 738:22 740:17 5 5 761:9 811:12,13 812:5 813:16,17 832:24 837:9 5,000 664:21 5.44 750:6 5:00 645:18 649:2 856:2 50 652:24 671:10 671:18 672:2 688:12 730:12 754:12 853:14 50's 681:24		

501 646:4	8				
52 761:7 766:20	8 841:25 842:1				
52.3 671:8	8th 758:21,22				
523 772:6	8-TCDD 788:10				
529 834:11	822:20 823:2				
53 761:7	824:4 825:5				
6	80's 667:6 777:11				
6 676:13 841:19	807 647:25				
6.2 737:23	810 648:3				
60 690:24 737:24	814 648:5				
60's 681:22,24,25	818 648:6				
60606-1229 646:9	819 648:7				
61 682:1 690:18,24	82 669:14				
713:10	822 648:9				
61.2 669:15	827 648:10				
61.4 671:7	830 648:12				
62 658:6 690:25	836 648:13				
691:1	838 648:14				
636 737:12	843 648:15				
649 647:5	849 648:17				
66 657:10	85 727:25 728:15				
662 646:14	728:16				
67 711:5,6	89 808:24 853:14				
675 647:9	9				
68 750:2	9 841:25				
687 647:10	9.597 820:20				
69 682:3	821:16				
696 647:11	9/11 675:1				
698 647:13	9:00 645:17 649:2				
7	90 657:14 754:10				
7 788:10 816:4,17	855:15,19				
816:20 822:20	910792 644:24				
823:1 824:4	92 792:8,9 828:16				
825:5 837:8,9	828:17 829:16				
70 665:22 682:3	853:13				
70602 646:4	93 853:13				
712 786:15	95 812:14 823:4,18				
73 709:25 713:6,7	838:13				
730 719:19	958 851:3				
74 833:3	962 823:9				
75 758:25 851:16	977 801:13				
852:25 853:1,20	979 800:25 804:15				
854:16,23	98 658:4,5 688:1				
855:24	701:14 745:21				
75.2 854:3	747:1 838:14,16				
765 647:14	838:17				
769 647:16	99 710:16 711:10				
77 713:10 763:16	755:22 770:1				
776 647:18	775:6,7 800:15				
78 763:16	811:24 838:16				
782 647:19	838:16				
785 647:20					
789 647:21					
79 713:11					
795 647:22					
799 647:23					

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF
MISSISSIPPI, WESTERN DIVISION

FRED BECK, ET AL.,)
)
Plaintiffs,) No. 3:03C0-P-D
)
vs.)
)
KOPPERS, INC., ET AL.,)
)
Defendants.)

JAMES DAHLGREN, M.D.
Santa Monica, California
Monday, August 1, 2005
Volume V

Reported by:
DIANA JANNIERE
CSR NO. 10034
JOB No. 912645

Page 859

APPEARANCES:

For Plaintiffs:

LAW OFFICES OF LUNDY & DAVIS, LLP
BY: KEITH PRUDHOMME, ESQ.
501 Broad Street
Lake Charles, Louisiana 70602
(337) 439-0707
kprudhomme@lundydavis.com

For Defendants Beazer, Inc., and Koppers, Inc.:

WILDMAN, HARROLD, ALLEN & DIXON, LLP
BY: ANTHONY G. HOPP, ESQ.
225 West Wacker Drive
Chicago, Illinois 60606-1229
(312) 201-2537
hopp@wildmanharrold.com

For Defendant Illinois Central Railroad:

UPSHAW, WILLIAMS, BIGGERS,
BECKHAM & RIDDICK, LLP
BY: CHRISTOPHER W. WINTERS, ESQ.
309 Fulton Street
Greenwood, Mississippi 38935
(662) 455-1613
chris@uwbb.com

Page 861

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF
MISSISSIPPI, WESTERN DIVISION

FRED BECK, ET AL.,)
)
Plaintiffs,) No. 3:03C0-P-D
)
vs.)
)
KOPPERS, INC., ET AL.,)
)
Defendants.)

DEPOSITION of JAMES DAHLGREN, M.D., Volume V,
taken on behalf of Defendants at 1700 Ocean Avenue,
Santa Monica, California, beginning at 9:10 a.m., and
ending at 4:45 p.m., Monday, August 1, 2005, before
Diana Janniere, Certified Shorthand Reporter No. 10034.

Page 860

INDEX

WITNESS	EXAMINATION
JAMES DAHLGREN, M.D. Volume V	
MR. HOPP	868
DEFENDANTS'	PAGE
151 Breast Cancer Risk in Relation to Adipose Concentrations of Organochlorine Pesticides and Polychlorinated Biphenyls in Long Island, New York	869
152 Serum Dioxin Concentrations and Breast Cancer Risk in the Seveso Women's Health Study	881
153 Serum Polychlorinated Biphenyls, Cytochrome P-450 1A1 Polymorphisms, and Risk of Breast Cancer in Connecticut Women	889
154 Organochlorine compounds and Estrogen-related Cancers in Women	895
155 Organochlorine Compounds in Relation to Breast Cancer, Endometrial Cancer, and Endometriosis: An Assessment of the Biological and Epidemiological Evidence	898
156 Critical Windows of Exposure for Children's Health: Cancer in Human Epidemiological Studies and Neoplasms in Experimental Animal Models	909

Page 862

1 (Pages 859 to 862)

Esquire Deposition Services
323.938.2461

1	EXHIBITS (Continued):	
2	DEFENDANTS'	PAGE
3	157 Antiestrogenicity of Environmental	
4	Polycyclic Aromatic Hydrocarbons	915
5	158 Synergistic Activity of Polynuclear	
6	Aromatic Hydrocarbon Mixtures as	
7	Aryl Hydrocarbon (Ah) Receptor	922
8	159 Pesticides and Cancer	928
9	160 Aromatic DNA Adducts and Polymorphisms	
10	of CYP1A1 and NAT2 and GSTM1 in	
11	Breast Cancer	930
12	161 Environmental Toxins and Breast	
13	Cancer on Long Island, I. Polycyclic	
14	Aromatic Hydrocarbon DNA adducts	935
15	162 Risk Factors for Breast Cancer	945
16	163 Tobacco Smoke Carcinogens and	
17	Breast Cancer	948
18	164 Epigenetics of Breast Cancer:	
19	Polycyclic Aromatic Hydrocarbons	
20	as Risk Factors	950
21	165 Genetic and Environmental	
22	Determinants on Tissue Response	
23	to In Vitro Carcinogen Exposure	
24	and Risk of Breast Cancer	953
25	166 Breast Cancer and Environmental	
	Risks: Where is the Link?	955
	167 Breast Cancer Incidence and	
	Exposure to Environmental Chemicals	
	in 82 Counties in Mississippi	958
	168 Epidemiological Factors of Cancer	
	in California	960
	Page 863	

1	EXHIBITS (Continued):	
2	DEFENDANTS'	PAGE
3	181 Cigarette Smoking and the Risk	
4	of Breast Cancer in women: A Review	
5	of the Literature	982
6	182 The Relationship between Genetic	
7	Damage from Polycyclic Aromatic	
8	Hydrocarbons in Breast Tissue and	
9	Breast Cancer	996
10	183 Molecular Epidemiologic Studies	
11	of Polycyclic Aromatic	
12	Hydrocarbons-DNA Adducts and	
13	Breast Cancer	1000
14	184 Interaction Between Genetic	
15	Polymorphism of Cytochrome P450-1B1	
16	and Environmental Pollutants in	
17	Breast Cancer Risk	1004
18	185 Reduced DNA Repair of Benzo[a]pyrene	
19	Diol Epoxide-induced Adducts and	
20	Common XPD Polymorphisms in Breast	
21	Cancer Patients	1009
22	186 Polymorphisms in the DNA Repair	
23	Enzyme XPD are Associated with	
24	Increased Levels of PAH-DNA Adducts	
25	in a Case-control Study of Breast	
	Cancer	1011
	187 Sulfotransferase 1A1 (SULT1A1)	
	Polymorphism, PAH-DNA Adduct Levels	
	in Breast Tissue and Breast Cancer	
	Risk in a Case-control Study	1014
	188 Association of Cancer Site and	
	Type with Occupation and Industry	
	from the Third National Cancer	
	Survey Interview	1017
	189 Sensitivity to Benzo[a]pyrene	
	Diol-Epoxide Associated with	
	Risk of Breast Cancer in Young	
	Women and Modulation by Glutathione	
	S-transferase Polymorphisms: A	
	Page 865	

1	EXHIBITS (Continued):	
2	DEFENDANTS'	PAGE
3	169 Immunoperoxidase Detection of	
4	Polycyclic Aromatic Hydrocarbon-DNA	
5	Adducts in Breast Tissue Sections	962
6	170 Second Follow-up of a Dutch Cohort	
7	Occupationally Exposed to phenoxy,	
8	Herbicides, Chlorophenols and	
9	Contaminants	967
10	171 Cohort Mortality Study of Capacitor	
11	Manufacturing Workers, 1944 to 2000	968
12	172 Health Impact of polychlorinated	
13	Dibenzo-p-dioxins: A Critical Review	973
14	173 Age Specific Dioxin TEQ Reference	
15	Range	975
16	174 Health Effects of Chlorophenol Wood	
17	Preservatives on Sawmill Workers	976
18	175 Molecular epidemiology: On the Path	
19	to Prevention?	977
20	176 Deregulation of Cell Proliferation	
21	by Polycyclic Aromatic Hydrocarbon,	
22	MFC-7 Cells Reflects Both Genotoxic	
23	and Nongenotoxic Events	980
24	177 Cytochrome P4501A1 and Glutathione	
25	S-transferase (M1) Genetic Polymorphisms	
	and Postmenopausal Breast Cancer Risk	983
	178 Cancer Incidents and Mortality in	
	Women Occupationally Exposed to	
	Chlorophenoxy, Herbicides, chlorophenols	
	and Dioxins	984
	179 Cancer Incidence in a Population	
	Accidentally Exposed to 2, 3, 7, 8-	
	Tetrachlorodibenzo-para-dioxin	986
	180 Carcinogen-DNA Adducts in Human	
	Breast Tissue	989
	Page 864	

1	EXHIBITS (Continued):	
2	DEFENDANTS'	PAGE
3	190 News section of the Journal	
4	of the National Cancer Institute	1022
5	191 DNA Repair Capacity of Lymphoblastoid	
6	Cell Lines from Sisters Discordant	
7	for Breast Cancer	1023
8	192 Polycyclic Aromatic Hydrocarbon-DNA	
9	Adducts in Humans: Relevance as	
10	Biomarkers for Exposure and Cancer	
11	Risk	1027
12	193 Genetic Susceptibility to Cancer	1032
13	194 Formation and Persistence of	
14	Benzo[a]pyrene Metabolite-DNA Adducts	1033
15	195 Bulky DNA Adducts and Risk of	
16	Cancer: A Meta-analysis	1035
17	196 Carcinogenesis of Mammary Gland in	
18	Rats	1037
19	197 Medical Hypothesis: Xenoestrogens as	
20	Preventable Causes of Breast Cancer	1038
21	198 Pesticides-How Research has Succeeded	
22	and Failed in Informing Policy:	
23	DDT and the Link with Breast Cancer	1042
24	199 Mixtures of Four Organochlorines	
25	Enhance Human Breast Cancer Cell	
	Proliferation	1044
	200 Aromatic DNA Adducts in Adjacent	
	Tissues of Breast Cancer Patients:	
	Clues to Breast Cancer Etiology	1046
	201 Developmental Effects of Dioxin	
	and Related Endocrine Related	
	Chemicals	1049
	202 The Association between Glutathione	
	S-Transferase M1 Genotype	1051
	Page 866	

2 (Pages 863 to 866)

1	EXHIBITS (Continued):	
2	DEFENDANTS'	PAGE
3	203 Cancer, Heart Disease, and Diabetes	
4	in Workers Exposed to 2, 3, 7,	
5	8-Tetrachlorodibenzo-p-dioxin	1052
6	204 DNA Adducts in Normal Tissue Adjacent	
7	to Breast Cancer: A Review	1053
8	205 Characterization of a Major Aromatic	
9	DNA adduct Detected in Human Breast	
10	Tissues	1056
11	206 Molecular Epidemiology in	
12	Environmental Carcinogenesis	1066
13	207 The Interaction Between Alcohol	
14	Consumption and GSTM1 Genotype on	
15	Polycyclic Aromatic Hydrocarbon-DNA	
16	Adduct Levels in Breast Tissue	1067
17		
18		
19		
20		
21		
22		
23		
24		
25		
	Page 867	

1 Santa Monica, California, Monday, August 1, 2005
2 9:10 A.M. - 4:45 P.M.
3
4 JAMES DAHLGREN, M.D.,
5 having been duly sworn, testified as follows:
6
7 FURTHER EXAMINATION
8 BY MR. HOPP:
9 Q Good morning, Dr. Dahlgren.
10 A Hi.
11 Q We are here for the fifth session of your
12 deposition for the Grenada, Mississippi/Creosote
13 litigation.
14 Last time we were working through some of the
15 studies that you referred to in your report and in a
16 supplemental bibliography that you gave me on May 9th of
17 2005.
18 What I would like to do this morning is to
19 continue with that. First, let me ask you: Have you
20 done anymore work to -- do you have any additional
21 references that we didn't either see on the bibliography
22 last time or that are cited in your first report?
23 A Oh, gosh, I don't think so. I think that -- I
24 don't remember now that I am sitting here that there are
25 additional ones. As we may go through, I might have one

Page 868

1 or two.
2 Q What you previously gave us is certainly
3 comprehensive?
4 A I tried to be. I tried to include everything
5 that is -- well, that is relevant to this case. And
6 unfortunately, you never can quite do that. There is
7 always a question that arises that is not covered with
8 the articles, but I tried my best.
9 Q Let's start with deposition Exhibit 151. This
10 is the Stellman, S-T-E-L-L-M-A-N, paper, entitled Breast
11 Cancer Risk in Relation to Adipose Concentrations of
12 organochlorine Pesticides and Polychlorinated Biphenyls
13 in Long Island, New York.
14 (Defendants' Exhibit 151 was marked
15 for identification by the court
16 reporter.)
17 BY MR. HOPP:
18 Q Do you have that paper?
19 A Yes, I do.
20 Q Did you rely on the Stellman paper for purposes
21 of your opinions in this case?
22 A Well, I think -- I mean, let me just see if
23 this is a -- yeah, I think that this is a paper that I
24 included because it found a correlation with PCBs and
25 breast cancer in the breast tissue.

Page 869

1 It probably isn't as strong a piece of evidence
2 as some of the other papers, but I am trying to notice
3 here which one of the PCBs that they found the
4 correlation with because the PCBs have a -- share some
5 similar toxicities, as the other dioxin-like chemicals.
6 So insofar as this paper supports the notion
7 that dioxin-like chemicals cause, at least in some
8 cases, an increased risk for breast cancer, it is
9 relevant to our study.
10 Q This paper, actually, appears to be part of the
11 National Cancer Institute's Long Island Breast Cancer
12 Study Project; is that right?
13 A That's correct.
14 Q Is that an ongoing project?
15 A I don't know. I actually think that they
16 probably stopped the study at this point. This was five
17 years ago, this was published. I don't know for sure,
18 but I believe it was probably concluded.
19 Q And were there other papers that came out of
20 this Long Island study?
21 A Yes. First, it was an epidemiological study
22 that showed an increase in breast cancer prevalence in
23 certain communities in Suffolk County where Stony Brook
24 is located, where one of the authors at least was from
25 Stony Brook.

Page 870

<p>1 And I think they were trying to figure out if</p> <p>2 there were some factors in that community that would</p> <p>3 give rise to breast cancer.</p> <p>4 There is also some studies that were done in</p> <p>5 New York City where they found a link to organochlorine</p> <p>6 pesticides and breast cancer. And this was a follow-up</p> <p>7 on that. So they were looking at that set of compounds</p> <p>8 as well.</p> <p>9 Q In the Long Island study -- the study -- strike</p> <p>10 that.</p> <p>11 In any of the other papers that have been</p> <p>12 studied -- strike that. Monday morning.</p> <p>13 In any of the papers that have been published</p> <p>14 regarding the Long Island study, did they identify any</p> <p>15 other strong risk factors for breast cancer other than</p> <p>16 the one or two congeners of PCBs that we see in the</p> <p>17 Stellman paper, if you remember?</p> <p>18 A They looked at some other factors. There was a</p> <p>19 pesticide that they were concerned about in Suffolk</p> <p>20 County in particular; but those studies, as I recall,</p> <p>21 were not positive. They didn't find a linkage between</p> <p>22 the pesticide and the breast cancer risk.</p> <p>23 So the cluster of diseases in that part of Long</p> <p>24 Island were never fully explained.</p> <p>25 Q In the Spellman -- I'm sorry. Stellman paper,</p> <p style="text-align: center;">Page 871</p>	<p>1 regarded as a cross-sectional</p> <p>2 surrogate for a continuum of</p> <p>3 exposures that may have been</p> <p>4 experienced earlier in life."</p> <p>5 Do you see that?</p> <p>6 A Yes, sir.</p> <p>7 Q Do you agree with that statement?</p> <p>8 A Yes, it is a problem. PCBs do have a long</p> <p>9 duration in the body, but they do not necessarily.</p> <p>10 If you take a reading, say, in the year 1999,</p> <p>11 you don't necessarily know what that persons level --</p> <p>12 relative level of any of these long-lasting compounds</p> <p>13 was the same 20 years ago or 30 years ago.</p> <p>14 What we know about the induction of cancer is</p> <p>15 that there is a phenomena called latency. So that</p> <p>16 usually the exposure that had occurred 10, 20, even 30</p> <p>17 years prior, may be the most important.</p> <p>18 Having said that, there is another mechanism by</p> <p>19 which cancer risk can be increased and that was not</p> <p>20 addressed in this paper per se.</p> <p>21 Q Which mechanism is that?</p> <p>22 A That is the reduction of the immune system</p> <p>23 making it more difficult for the body to fight off</p> <p>24 cancer. And that has been put forward with dioxins and</p> <p>25 dioxin-like compounds as an important mechanism by which</p> <p style="text-align: center;">Page 873</p>
<p>1 the only PCB congener in which they found -- for which</p> <p>2 they found an increased risk of breast cancer was 183;</p> <p>3 is that correct?</p> <p>4 A That's correct.</p> <p>5 Q Look at the Abstract, they did not confirm a</p> <p>6 previously reported association between breast cancer</p> <p>7 and PCB congener 118; is that right?</p> <p>8 A Correct.</p> <p>9 Q And they also looked at the most abundant PCB</p> <p>10 congener and did not find an association there; is that</p> <p>11 right?</p> <p>12 A That's correct. I believe that is correct.</p> <p>13 Let me just double-check.</p> <p>14 153, the most abundant di-ortho congener. It</p> <p>15 makes up nearly one-fourth of total PCBs in human</p> <p>16 indices, but didn't possess estrogenic properties.</p> <p>17 Q Let's look at Page 1246. It is 1246.</p> <p>18 A Yes.</p> <p>19 Q Next to Table 4, there is a statement. It</p> <p>20 says, "A serious weakness of this study</p> <p>21 As with all case-control and</p> <p>22 prospective studies in which</p> <p>23 measurement of body burden is</p> <p>24 Made at a single time, is that</p> <p>25 Such a measurement may at best be</p> <p style="text-align: center;">Page 872</p>	<p>1 there is an increased risk for cancer.</p> <p>2 So that the exposure of the person may have</p> <p>3 been in the 5 to 10 years before -- 3 to 5 to 10 -- I</p> <p>4 mean, the rate at which cancers grow is relatively slow.</p> <p>5 Just in real broad round terms, the doubling</p> <p>6 time for lung cancer, which is the most well studied, is</p> <p>7 probably in the range of four months and breast cancer</p> <p>8 is probably similar.</p> <p>9 So that by the time it is large enough to be</p> <p>10 diagnosed, it has probably been there for 2, 3, 4 years,</p> <p>11 depending on the growth of the tumor.</p> <p>12 And in this particular case, they had a number</p> <p>13 of cases that were under age 50. They had a total of</p> <p>14 34 percent of their population of cases were under 50</p> <p>15 and 55 percent of the controls were under 50. The</p> <p>16 reason I am focusing on those is those might have been</p> <p>17 more rapidly growing tumors.</p> <p>18 Anyway, the mechanism by which dioxin-like</p> <p>19 chemicals -- like PCBs, and the dioxins we are looking</p> <p>20 at in this area -- induce cancer is not which causes</p> <p>21 genetic damage, it is altering the mechanism, such as</p> <p>22 chemical PAHs as to more active carcinogenic agents.</p> <p>23 No. 2 is reducing the immune system and</p> <p>24 altering the ability of the body to kill cancer cells.</p> <p>25 And the third mechanism is by estrogenic or</p> <p style="text-align: center;">Page 874</p>

4 (Pages 871 to 874)

1 other hormonal changes which influence, promote the
2 growth or likewise co-inhibit the growth of tumors. So
3 those three mechanisms are established for dioxin-like
4 chemicals.

5 This particular paper really focused on the
6 estrogenic properties which is -- which is fine, but one
7 of the problems which they did in this case, which I
8 think reduced its ability to detect the difference is
9 they used patients with benign breast disease as
10 controls. 250 patients with benign breast disease and
11 73 patients admitted for other surgical procedures.

12 They basically had used patients that had some
13 already abnormality in their breast tissue as controls
14 and I think that was not a good idea. It would have
15 been much better to have patients totally free of breast
16 disease. Free of any confounding problems associated
17 with the mechanism that leads to benign breast disease
18 that may well be the same mechanism that leads to the
19 malignancy.

20 But, anyways, the paper is in the literature
21 and I have included it in my group of papers because it
22 does have a parallel. In spite of that weakness, it
23 still shows the difference with this one PCB that we
24 just talked about.

25 (Brief Recess.)

Page 875

1 they did and what the 25th and 75th percentiles were in
2 parts per trillion.

3 Q Because these were PCBs and not dioxins
4 specifically, this paper is analogous to your
5 conclusions regarding Sherrie Barnes but not directly
6 related; is that right?

7 A Correct. It just shows the tenancy of
8 dioxin-like chemicals to induce breast cancer. This
9 study by itself, of course, wouldn't be supportive of
10 that, but when taken in context with everything else
11 that we know about -- about dioxin and dioxin-like
12 chemicals, I believe, it is supportive.

13 Q It wouldn't -- this paper the Spellman --
14 strike that.

15 This paper, the Stellman paper would not be
16 supportive because it is largely a negative study;
17 right?

18 A Yes, except for that one association that you
19 mentioned, there are a lot of other points that could be
20 made about this paper.

21 Let me just make one major point. And, I
22 think, we made it in the last deposition. And I made
23 the point that unless you look at genetic factors, your
24 going to weaken your ability to see an effect.

25 In other words, we now know that there is what

Page 877

1 BY MR. HOPP:

2 Q Dr. Dahlgren, is benign breast disease itself
3 considered to be a risk factor for breast cancer?

4 A Yes.

5 Q Let's look at Page 1245 just the first sentence
6 in the word -- I'm sorry, in the section Discussion,
7 this is, again, the Stellman paper.

8 MR. PRUDHOMME: I'm sorry, which page?

9 MR. HOPP: 1245, right underneath the heading
10 Discussion, it says, "The present analysis
11 For the Long Island population is
12 consistent with numerous studies and
13 other populations that have shown
14 little association between OCC body
15 burden and breast cancer risk."

16 Do you agree with that statement?

17 A When you say "several," I guess, it is a
18 question of what do you mean by that? But, yeah, there
19 are some other studies.

20 Originally, the early studies showed a positive
21 association and then there were a couple of more done
22 subsequently, that did not find an association.

23 Q How did they measure body burden in this study?

24 A They did a blood level for the chlorinated
25 hydrocarbon pesticides. Shown on Table 2, which ones

Page 876

1 we call the gene/environment interaction.

2 Q This gene, slash, environment interaction?

3 A Correct. So that what we now know if you
4 really want to see an effect of a chemical, it is
5 important to try to identify the various genetic
6 predispositions that exist for the development of breast
7 cancer.

8 And we talked about it, I think, in terms of
9 PAHs in the last deposition. When they started looking
10 at the specific genotypes or polymorphisms, as they
11 called it, and then looked for environmental factors and
12 then, let's say, the effect of cigarette smoke causing
13 an increased risk of breast cancer was clearly present.

14 And I believe that, that will be true here with
15 the organochlorines and the dioxins and the PCBs. And
16 the second point is something we also -- that I want to
17 emphasize is something that we talked about a minute
18 ago.

19 They looked at these patients after the
20 diagnosis was made. If you look at the animal studies
21 for dioxin-like chemicals, it is most important to know
22 what they were exposed to in early life. And that that
23 sets in motion, changes that make an increased risk for
24 breast cancer.

25 And that is based on animal studies, where if

Page 878

5 (Pages 875 to 878)

Esquire Deposition Services
323.938.2461

<p>1 you expose animals in utero or in the first infancy, the 2 first few months of life to the dioxins, there is an 3 increased risk of breast cancer. If you expose the 4 animals as adults to dioxin, there is not an increased 5 risk of breast cancer.</p> <p>6 So timing of the exposure is important in 7 breast cancer. So, in other words, this study here, 8 which has, you know, I think, some value because in 9 spite of all of these problems, there was still an 10 association shown; but they ignored it for reasons that 11 I am not sure.</p> <p>12 They said, well, you know, we did so many 13 measurements, finding one measurement that stood out was 14 not significant. I don't think that is really quite 15 accurate if you look at all of the evidence.</p> <p>16 These PCBs, dioxin-like chemicals, have been 17 shown in test systems to increase the risk of breast 18 cancers from the various mechanisms that I have 19 mentioned.</p> <p>20 And therefore, I think their study in spite of 21 their conclusion that it was not significant, I think 22 viewed in the context of all of the evidence, it is 23 significant.</p> <p>24 Q The genetic factors you talked about a moment 25 ago, you talked about various polymorphisms and the fact</p> <p style="text-align: center;">Page 879</p>	<p>1 context of the animal studies; is that right?</p> <p>2 A Yes, that is what I've said.</p> <p>3 Q Let me show you what I have marked as Exhibit 4 152. This is the Warner paper. It is entitled Serum 5 Dioxin Concentrations and Breast Cancer Risk in the 6 Seveso Women's Health Study.</p> <p>7 (Defendants' Exhibit 152 was marked 8 for identification by the court 9 reporter.)</p> <p>10 BY MR. HOPP:</p> <p>11 Q And forgive me for repeating, just for context, 12 Seveso is a town in Italy; correct?</p> <p>13 A Correct.</p> <p>14 Q And Ms. Warner indicated in July of 1976, there 15 was an explosion of a trichlorophenol manufacturing 16 plant near the city; is that right?</p> <p>17 A Yes.</p> <p>18 Q That resulted in the highest TCDD levels known 19 in human residential populations; right?</p> <p>20 A No, I think that --</p> <p>21 Q That is what she says?</p> <p>22 A -- I think that is probably correct. There are 23 some other examples of higher levels in people but not 24 from a residential exposure.</p> <p>25 Q We talked about Revage last time and there were</p> <p style="text-align: center;">Page 881</p>
<p>1 that people with individual polymorphisms or specific 2 polymorphisms may be more prone to contract a specific 3 disease if they are exposed to certain chemicals; is 4 that right?</p> <p>5 A Yes, the evidence is strong that that happens.</p> <p>6 Q And we talked about that a little bit before in 7 terms of PAH, and we have got several studies on that 8 subject with various PAHs and specific polymorphisms?</p> <p>9 A Correct.</p> <p>10 Q Are you aware of any literature that looks at 11 the issue of susceptibility in people with specific 12 polymorphisms in the context of dioxin or PCB exposure?</p> <p>13 A No, they mention it in this paper, but they did 14 not look at it.</p> <p>15 Q I mean, as far as you know, that is the work 16 that is yet to be done in the literature that is yet to 17 be delivered or deliverable?</p> <p>18 A As far as I know, it has not been done. I have 19 not come across a study like that, but everybody knows 20 we need to do it.</p> <p>21 Q And, again, just to follow up on what you said 22 a moment ago, you talked about prenatal exposure and 23 increased risk.</p> <p>24 The work on prenatal exposure and in increased 25 risk in breast cancer, that really has been done in the</p> <p style="text-align: center;">Page 880</p>	<p>1 some even higher levels in that industrially 2 exposed population?</p> <p>3 A That's correct.</p> <p>4 Q Now, again, forgive me if we've covered some of 5 this, but there has been a series of papers published on 6 the Seveso population?</p> <p>7 A There have been, yes.</p> <p>8 Q Many of them published by someone named 9 Bertazzi.</p> <p>10 A Dr. Bertazzi has published several of them.</p> <p>11 Q And in the Seveso studies, they divided the 12 population into three zones; right?</p> <p>13 A Well, I am trying to remember -- three zones 14 which would be high, medium and low.</p> <p>15 Q Sure. Let's look at --</p> <p>16 A A, B, and C; is that what they call them?</p> <p>17 Q This is page -- take a look at Page 625 of the 18 Warner study, this is in the second column, the first 19 paragraph that starts with the words, "On 10 July 1976," 20 if you look down there a little bit, it says which was 21 divided into exposure Zones A, B and R; right? Those 22 are the three exposure zones?</p> <p>23 A Yes. Well, there is also the non-ABR. There 24 is -- that is what I was trying to remember. There is 25 actually four zones.</p> <p style="text-align: center;">Page 882</p>

1 Q Right. The papers uniformly referred to people
2 in these four zones; is that right? And this is
3 nomenclature they adopted for the Seveso papers?

4 A Right. They were going to follow these folks
5 when the money was made available for that purpose.

6 You're right. They looked at what they thought
7 was a surrogate of exposure of where they were.

8 Q By where they lived or where they lived at the
9 time of the exposure?

10 A That's right.

11 Q And the idea, again, with Seveso was because it
12 was a large amount of TCDD and it settled over the
13 community, it was ongoing exposure through daily living
14 and eating plants, vegetables, and things like that; is
15 that right?

16 A Correct.

17 Q Now --

18 A It was a zone that was evacuated also -- maybe
19 that is a different issue.

20 Q Warner then looked at 15 women; is that right?

21 A Let's see, infants to 40 years of age and 76
22 resided in the area, total number of characteristics of
23 breast cancer; 15 breast cancer cases were identified.
24 The cohort was 981 women who matched that.

25 Q 981 women matched the cohort description and

Page 883

1 among them, there were 15 breast cancer cases?

2 A Yes. Actually, when they first started the
3 study in March of 1996, they had 1271 eligible women;
4 but they had a bunch that they couldn't locate or
5 wouldn't participate.

6 981, 80 percent eventually participated. So
7 they had a 20 percent rate that they could not identify
8 or locate.

9 Q Look at Figure 1, this is on Page 627.

10 A All right.

11 Q Figure 1, Page 627, this shows a graph
12 cumulative distribution of serum TCDD levels in the
13 breast cancer cases; is that right?

14 A Yes, it starts off with the serum TCDD level.
15 Right.

16 Q And it shows, basically, a curve; is that
17 right?

18 A Well, they start with the lowest and go to the
19 highest.

20 Q And, I guess, my point on this is that it is
21 not a linear diagram. It gives us sort of a backward
22 S-type curve; is that right?

23 A Well, this is just one of those cumulative
24 distribution curves showing what the -- you know,
25 50 percent level would be.

Page 884

1 You know, you can look at the 95 percent and
2 25 percent confidence interval and see the range.

3 Q Look right above the chart, it says,
4 "Although the total number of cases
5 is small, the TCDD levels for women
6 with breast cancer appear to be
7 shifted to the right at the low end
8 of the cumulative distribution. At
9 the high end of the distribution the
10 shift is not apparent."

11 What does that mean?

12 A Well, if you look at -- what he's got here is
13 the full cohort, you know, is the solid line.

14 Q Okay.

15 A The cases are the little diamond shaped.

16 Q Got it.

17 A And he is looking at the fact that the lower
18 end of the curve there is a light shift to the right and
19 if you were to connect those diamonds together, the line
20 would not superimpose itself on the full cohort.

21 Q Okay. Thank you.

22 A So what it suggests is that at that end of the
23 curve, the values tend to be a little higher.

24 In other words, there is more women who have
25 the level here, which it looks like about 50 to 100,

Page 885

1 then women who have values above 100 because then it
2 looks like the diamonds match with the rest of the
3 population.

4 The significance of that is not terribly
5 powerful because there is only 5 data points above 100
6 there. Well, above 110. And I think that -- I would
7 not make too much out of it because of the small
8 numbers.

9 Q Picking up on that point Page 628, right at the
10 end, they talk about some of the issues with the study.
11 If you look really at the second to the last full
12 sentence of the article, it says, "This

13 Result should be considered an early
14 finding because the number of cases
15 is small and the cohort is relatively
16 young."

17 Do you see that?

18 A Yes, I do.

19 Q Has there been additional papers published on
20 the Seveso women's health study since the Warner paper
21 in 2002?

22 A Not to my knowledge.

23 Q Again, let's look at the first page of Warner
24 just to conclude. This is the second column under the
25 paragraph that starts with the date "10 July 76." It

Page 886

<p>1 says, "Ten- and fifteen-year follow-up 2 Studies of the Seveso population 3 found no increased risk for breast 4 cancer incidence or mortality. 5 However, after 20 years of follow-up, 6 a statistically nonsignificant 7 increased risk for breast cancer 8 mortality emerged among women who 9 resided in zones A or B," and then 10 Does Warner present further evidence of a 11 statistically significant association between breast 12 cancer and serum TCDD levels? 13 A Isn't that what this paper is about? 14 Q I just want to make sure that is your 15 understanding. 16 A Yeah, if you look at the results of Cox, 17 Table 3 -- 18 Q Okay. 19 A It shows a statistically significant increase 20 in the risk associated with TCDD levels at a risk -- 21 relative risk of 2.1 with a statistical significant 22 value of .05. And 4.5 is the confidence. 23 Q What is the range of serum TCDD levels in the 24 women in the Seveso -- 25 A 13 to 1960.</p> <p style="text-align: center;">Page 887</p>	<p>1 do is quantify the other peaks. And I have been 2 frustrated by the Seveso studies ever since the 3 beginning. 4 And I remember one of my colleagues Dr. Copiro 5 was in Italy at tight he was a pathologist and he was 6 interested in these cases. 7 And he went to Dr. Patrosi and he asked him, 8 why he didn't do this. And Dr. Patrosi refused to 9 answer the question, which I found very strange. But 10 anyway, a lot things about the Seveso studies -- you 11 know, obviously, are important. 12 For example, we just talked about genetic 13 susceptibility and certainly, when this study was 14 published in 2002, that whole issue of the gene 15 environment interaction was well-known. And it would be 16 relatively easy for them to study that in these women. 17 Anyway, it is one of my frustrations. 18 Q Let's look at deposition Exhibit 153. This may 19 head us in the direction here we are talking about. 20 This is the Zhang, Z-H-A-N-G, paper? 21 (Defendants' Exhibit 153 was marked 22 for identification by the court 23 reporter.) 24 THE WITNESS: Yes. 25</p> <p style="text-align: center;">Page 889</p>
<p>1 Q And that is parts per trillion? 2 A That's right. It's really, really high values. 3 Q Certainly, higher than background exposures or 4 say, the Dallas cohort that Dr. Schecter has published 5 on repeatedly; is that right? 6 A That's right. 7 Q Let's look at -- 8 A They didn't do total TEQs. They just did 9 TCDDs. 10 Q Right. 11 A And I don't know why they did that. I mean, 12 obviously, TCDDs is an important contaminant here, but 13 probably would help if they had done the full spectrum 14 because that explosion just didn't expose them to TCDD. 15 It exposed them with the full range of chemicals in that 16 class. 17 Q Do you know if any of the Seveso studies had 18 looked at total TEQ? 19 A No, it looks like they always done TCDDs. It 20 is sort of maddening because by the time they do the 21 analysis for TCDDs, they can do the other congeners 22 because they have done all of the cleanup steps and done 23 all of the work. 24 Q They had the blood. 25 A They had the blood samples and all they had to</p> <p style="text-align: center;">Page 888</p>	<p>1 BY MR. HOPP: 2 Q And it is entitled Serum Polychlorinated 3 Biphenyls, Cytochrome P-450 1A1 Polymorphisms, and Risk 4 of Breast Cancer in Connecticut Women. 5 Do you see that? 6 A Yes. 7 Q Did you rely on this paper for the purposes of 8 forming your opinions in this case? 9 A Yes. 10 Q What is the conclusion of this paper in a 11 nutshell? 12 A That there is an increased risk in those women 13 that have this subtype. 14 Q And the subtype being, it is a particular type 15 of polymorphism; is that right? 16 A Yes, they had the 1A1, m1 and m4 genotypes, are 17 not associated with breast cancer risks, but the m2 was 18 associated with increased risk, making the point that I 19 made earlier. 20 However, they really only looked at the one 21 sub -- the one variation, if you will. And there are 22 other important polymorphisms. And I predict that those 23 will also be done as we go along. 24 Q So this looked at one particular -- sorry. 25 Several polymorphisms and found an association</p> <p style="text-align: center;">Page 890</p>

<p>1 with just one?</p> <p>2 A That's correct. They looked at the CYP1A1.</p> <p>3 That, I think, is the only polymorphism that they looked</p> <p>4 at.</p> <p>5 And I am just saying that there are some others</p> <p>6 that have been shown that seem to be important for</p> <p>7 breast cancer risk as well, that they didn't look at,</p> <p>8 but still very important paper along those lines that we</p> <p>9 have been talking about.</p> <p>10 Q And what it was looking, though -- strike that.</p> <p>11 What it was looking at was serum PCB levels,</p> <p>12 that means the level of PCBs in the women's blood; is</p> <p>13 that right?</p> <p>14 A Yes. And unfortunately, they didn't do all of</p> <p>15 the various congeners, as I recall. Let me just</p> <p>16 double-check that.</p> <p>17 Q Which congeners did they do?</p> <p>18 A I am looking forward to see what they did.</p> <p>19 Yeah, they did the ones that are listed here.</p> <p>20 I won't recount them, but they didn't do all of them.</p> <p>21 Q Where are they listed?</p> <p>22 A On Page 1178, in the 4th full paragraph in the</p> <p>23 right column, it says, "The following PCB</p> <p>24 Congeners were measured," and they did 10</p> <p>25 congeners.</p> <p style="text-align: center;">Page 891</p>	<p>1 looked at PCBs?</p> <p>2 A I'm sorry. I said ten. There were nine</p> <p>3 congeners, but what they did was they totaled the nine</p> <p>4 and just did the statistics against the totals. And if</p> <p>5 you notice, that it is in the parts per billion range.</p> <p>6 So they didn't have a very sensitive assay to</p> <p>7 get into the parts per trillion range that you need to</p> <p>8 do to get all of the various congeners of interest.</p> <p>9 Q They didn't compare individual congeners; they</p> <p>10 looked at totals?</p> <p>11 A That's right.</p> <p>12 Q And these are all Caucasian women from</p> <p>13 Connecticut; correct?</p> <p>14 A That's right.</p> <p>15 Q And is this a positive study? Did they find an</p> <p>16 association?</p> <p>17 A Let's see.</p> <p>18 Q Let me direct you. I think this is Page 1181.</p> <p>19 A Um-hmm.</p> <p>20 Q The right-hand column, first full paragraph,</p> <p>21 "In our study, a significantly</p> <p>22 increased risk of breast cancer</p> <p>23 Was found only for the CYP1A1 m2</p> <p>24 genotype?"</p> <p>25 A Right. I think, they -- lack of association</p> <p style="text-align: center;">Page 893</p>
<p>1 Q I see. Just for the record then, they did</p> <p>2 congener 74, 118, 138, 153, 156, 170, 180, 183, and 187;</p> <p>3 is that right?</p> <p>4 A That's correct.</p> <p>5 Q So they took blood samples from these women,</p> <p>6 who were being treated for breast cancer and analyzed it</p> <p>7 for levels of those congeners; is that right?</p> <p>8 A That's correct.</p> <p>9 Q And they also looked to see if they had this</p> <p>10 polymorphism in their gene; is that right?</p> <p>11 A That's right.</p> <p>12 Q And they compared the levels of PCBs with the</p> <p>13 people with the polymorphisms and then found whether or</p> <p>14 not there was an increased risk?</p> <p>15 A That's right.</p> <p>16 Q Now, in our case, that is the Grenada/creosote</p> <p>17 litigation, have you looked for polymorphisms in the</p> <p>18 blood of any of the people whose blood you sampled?</p> <p>19 A No, I haven't had the access to that particular</p> <p>20 variable that I have found.</p> <p>21 Q So that data does not exist for the Grenada</p> <p>22 cohort?</p> <p>23 A No, I don't have that data.</p> <p>24 Q And, again, this is PCB as opposed to TCDD or</p> <p>25 dioxin congeners; right? That is, the Zhang paper</p> <p style="text-align: center;">Page 892</p>	<p>1 with serum PCB levels. And, again, they used benign</p> <p>2 breast disease as controls. I think clearly is for the</p> <p>3 reasons I mentioned earlier is a mistake.</p> <p>4 Q I don't want to interrupt but just so we are</p> <p>5 clear, a better way to do the study would be to use</p> <p>6 women who had not been diagnosed with any type of breast</p> <p>7 disease as a control population?</p> <p>8 A Correct. You are really confounding the study</p> <p>9 rather significantly.</p> <p>10 Q And in the Zhang paper, it admits that it is a</p> <p>11 drawback or a weakness in the study?</p> <p>12 A Yes, they do. But, again, though, I think</p> <p>13 probably most importantly, they -- well, that is -- that</p> <p>14 may be probably the most important problem in terms of</p> <p>15 not finding an association and why they wouldn't.</p> <p>16 Q All right. I'm sorry. Are you done?</p> <p>17 A They go on to discuss the fact that they needed</p> <p>18 more PCB-detailed analysis to explain the link.</p> <p>19 Q And so the Zhang paper can best be described as</p> <p>20 a step in the direction of evaluating the connection</p> <p>21 between organochlorine exposure and various</p> <p>22 polymorphisms, but an incomplete step in that direction?</p> <p>23 A Yes, for those reasons. But may be some others</p> <p>24 we can talk about, but those are the major ones.</p> <p>25 Q Let's look at deposition Exhibit 154. This is</p> <p style="text-align: center;">Page 894</p>

<p>1 the Adami paper, A-D-A-M-I. 2 (Defendants' Exhibit 154 was marked 3 for identification by the court 4 reporter.) 5 THE WITNESS: Yes. 6 BY MR. HOPP: 7 Q Entitled Organochlorine compounds and 8 estrogen-related cancers in women. 9 This is a review article; is that correct? 10 A Yes, they are reviewing other papers. I don't 11 think there is original data here. I think this is sort 12 of a meta-analysis type of paper. 13 Q Let's talk about that. One of the papers that 14 you did cite and we will get to, was, in fact, a 15 meta-analysis or described itself as a meta-analysis. 16 What is a meta-analysis? 17 A That is where they take the various studies, 18 let's say, there is 8, 10, 12 different studies of a 19 subject, try to put the data all together. So all of 20 the exposed or cases and all of the controls, thus, 21 increasing the power to detect a difference. 22 Often studies have only a small number of 23 people. The power to detect and effect is less. So by 24 doing a meta-analysis you increase your ability to do 25 that.</p> <p style="text-align: center;">Page 895</p>	<p>1 know what they said. 2 It doesn't describe -- they simply say, 3 "At present, there are no biological 4 or ecological or analytic data 5 available that can be utilized to 6 indicate that there would be a 7 dominance one way or the other where 8 that exposure level that can affect 9 human cancer risks have been achieved 10 in any but the most unusual 11 situations," but they don't really 12 say what they mean. 13 Q So this is largely a negative study? 14 A Well, no, this is a review article. It is not 15 a study. 16 Q That's right. 17 A It, basically, cites the various papers. And I 18 think that is probably its greatest value, is that it 19 included a few papers that -- what I find when I look at 20 these types of papers, is that they have a paper that I 21 haven't seen before in their bibliography due to the 22 imperfect search engines that we have out there. 23 They know. But, obviously, their conclusion 24 was that their reading of the literature was if it 25 didn't prove a link and they give their -- "Our summary</p> <p style="text-align: center;">Page 897</p>
<p>1 Q And just as an example, there was a paper by 2 Worberg that did that on TCDD, which was a famous 3 meta-analysis; is that right? 4 A Yes, there are a number of papers like that. 5 Q So Adami looks at other papers that discuss 6 organochlorine compounds and estrogen-related cancers; 7 is that right? 8 A Right. 9 Q And in the Abstract, one of the things they say 10 is in humans in neither ecologic data, nor occupational 11 studies provide clear support for an association between 12 organochlorine exposure and the occurrence of these 13 cancers, and that is breast and endometrial cancers? 14 A That's right. That is what they say. 15 Q And then they conclude and this, again, is in 16 the Abstract. It states, "We conclude 17 That available data do not indicate 18 that organochlorines will affect the 19 risk of these two cancers in any but 20 the most unusual situations." 21 A That is what it says. 22 Q In what sort of situations did Adami and its 23 co-authors find an increased risk of breast cancer? 24 A Okay. Let's see what did they find here that 25 was -- I have to go back to the Discussion. I don't</p> <p style="text-align: center;">Page 896</p>	<p>1 analysis," which they don't call a meta-analysis, but 2 they call it a summary analysis of occupational exposure 3 of organochlorines. 4 The rate ratio of breast cancer for exposed was 5 0.84, which is 84 percent, which would have suggested 6 that there is no excess. And for PCBs, it's 108 -- I'm 7 sorry. It is 84 for PCB's and 108 for TCDDs. And then 8 they say for DDE, it is 1.27. That is their review of 9 the literature. 10 Q And those are really the marker compounds they 11 look at: TCDD, PCBs and DDE; is that right? 12 A Yes. And they don't necessarily -- this paper 13 was published in '95. So there has been quite a bit of 14 work since that time. But, you know, this paper was of 15 interest because it had a review of papers which is why 16 I included it. 17 Q So generally informative, but not supportive of 18 causation in the case of Sherrie Barnes; is that right? 19 A It is not supportive. That is correct. 20 Q Let's look at the next one. It says Ahlborg, 21 A-H-L-B-O-R-G, deposition Exhibit 155. 22 (Defendants' Exhibit 155 was marked 23 for identification by the court 24 reporter.) 25 BY MR. HOPP:</p> <p style="text-align: center;">Page 898</p>

1 Q And the Ahlborg paper is entitled
2 Organochlorine Compounds in Relation to Breast Cancer,
3 Endometrial Cancer, and Endometriosis: An Assessment of
4 the Biological and Epidemiological Evidence.
5 This is another review paper; is that right?
6 Actually, it is a journal called Critical Review of
7 Toxicology.
8 A By the way, we should go back to the Adami
9 paper for one second.
10 Q Sure.
11 A And point out that it was supported by the
12 Chemical Manufacturers Association and further support
13 from the Swedish Cancer Society.
14 Q You think that indicates some lack of
15 objectivity?
16 A No. I think what -- it is interesting that
17 usually when industries sponsors a study they are
18 negative. You know, it is just -- I can't say that
19 there was necessarily bias, but why would someone write
20 a review paper.
21 Why wouldn't someone spend the money doing some
22 primary research, writing up a review paper when you
23 have a nice big grant from the Chemical Manufacturer's
24 Association, it seems to me, you want to collect some of
25 your own data. We got how many authors on this paper?

Page 899

1 It's 1, 2, 3, 4, 5, 6, 7, 8 authors on the paper, which
2 means that somebody did a heck of a lot of work.
3 And So, therefore, it probably cost a lot of
4 money. And, you know, my feeling would be they should
5 have invested some of that money on some of the issues
6 that we have discussed where we need more information.
7 Q And one can bias a review paper by selecting
8 the underlining papers to review in sort of a skewed
9 manner; right?
10 A A. And B, what you do is criticize the
11 positive papers and you sort of give greater credence to
12 the negative papers, which, you know, you can argue
13 these things back and forth, which, of course, people
14 do. I just -- I just think in passing, I thought it was
15 worth noting that.
16 Q Okay. Let's move on to another paper, Exhibit
17 155.
18 (Defendants' Exhibit 155 was marked
19 for identification by the court
20 reporter.)
21 THE WITNESS: That's correct. The same year,
22 by the way.
23 BY MR. HOPP:
24 Q Right. 1995, it is the Ahlborg paper?
25 A It is basically the same work. It is the

Page 900

1 Harvard University grant from the Chemical Manufacturers
2 with the additional support of the Swedish Cancer
3 Society. So that these two papers are really parallel.
4 Q Does Ahlborg find an association between
5 organochlorine compounds and breast cancer?
6 A Well, they make the same conclusions they did
7 in their previous paper. The cancer causes and control
8 paper and the critical review paper, I think practically
9 cover the same ground.
10 I don't see that they have added much to the
11 discussion and they come to the same conclusion. That
12 the rates -- let's see, do they have exactly the same
13 rates? This is a little bit longer paper.
14 Well, in fact, the Ahlborg paper looks not only
15 at human epidemiology, but mouse studies and it looks at
16 some of the animal studies.
17 And I am looking to see if they do their
18 summary analysis, yeah. And then they do talk about in
19 vitro/in vivo animal studies in more detail. But they
20 also review some of the same papers -- the
21 epidemiological papers.
22 Their conclusions go on for several pages. Any
23 particular conclusion that you are interested in? I
24 mean, the bottom line was they recommended, as they did
25 in their other paper, that they looked at other end

Page 901

1 points in breast cancer as being more likely to be -- to
2 show a weak estrogen effect.
3 Q Did you rely on the Ahlborg paper for the
4 purpose of your opinions in this case?
5 A As I said about the other review paper, review
6 papers are mainly useful for sort of pulling together
7 all of the references. And since they don't contain any
8 new data, the underlining papers are what you rely upon
9 in reaching a conclusion.
10 You don't usually rely upon the opinion of
11 someone else who has written a review paper. It doesn't
12 mean you can't, I guess, but I think the real issue is
13 to rely upon the data and see what the data shows.
14 Q For an exercise like the one that you have gone
15 through in this case, the primary research is the stuff
16 you really going to want to look at in forming your
17 opinions?
18 A That's right.
19 Q And review papers are simply helpful to collect
20 the primary research?
21 A That's right.
22 Q Let's just look at the Abstract on Ahlborg.
23 This is towards the end of the Abstract. It says,
24 "The hypothesis that human exposure
25 to environmental levels of

Page 902

<p>1 organochlorines would favor an 2 estrogenic overactivity leading to an 3 increase in estrogen-dependent 4 formation of mammary or endometrial 5 tumors is not supported by the 6 existing in vitro, animal and 7 epidemiological evidence." 8 In the ten years since Ahlborg was published, 9 are you aware of additional evidence that has come up 10 that supports the notion that exposure to these 11 organochlorines favor estrogenic overactivity leading to 12 an increase in estrogen-dependent formation of mammary 13 cancers? 14 A Yes, I think there are studies now that make it 15 even clearer that there is a link, but you have to take 16 into account the specific agents and you have to take 17 into account time of exposure, and you have to take into 18 account the genetic predisposition. 19 Q All of the things that you started talking 20 about this morning? 21 A Right. And in 1995, none of those variables 22 were addressed in the various studies that were done, 23 which is why you saw a weak associations as this author 24 calls it or these authors. 25 Q Since '95, though, we have seen some papers</p> <p style="text-align: center;">Page 903</p>	<p>1 last 40 years. While many other cancers have stayed the 2 same or decreased in frequency. The same is true for 3 prostate cancer which is increasing steadily and even 4 more marketably in breast cancer. Both of those are 5 felt to be hormonally-related cancers. And it is likely 6 that there are factors in our environment. 7 In fact, our causing this condition because 8 when people move from low cancer risk countries to high 9 cancer risk countries, they begin to approximate the 10 host country or their destination country in terms of 11 their risk. 12 And that has been shown, for example, with 13 Japanese women. If they are of Japanese descent and 14 they are raised in the United States, they have American 15 breast cancer risks. If they are Japanese descent and 16 raised in Japan, they have Japanese breast cancer risks 17 showing that it is environmental. That it's a 18 environmental factor. 19 Q Have American women who are raised in Japan, if 20 there are enough of them, ever been studied? 21 A Never been studied. I don't think there are 22 very many of them. 23 Q In a lot of the studies that I have read over 24 the last couple of weeks and the ones that I have shown 25 you, start with a sentence something like, there is this</p> <p style="text-align: center;">Page 905</p>
<p>1 which indicate an increased risk of breast cancer with 2 particular congeners of dioxin or PCBs and other 3 congeners of PCBs or dioxins which have an 4 antiestrogenic effect; is that right? 5 A Yes. And that goes to this issue that we are 6 talking about. You have to get to the specifics of the 7 various congeners, A, but equally important, you have to 8 also look at the time of the exposure, given the age in 9 which they were exposed, which I think is very 10 important. But then there is also the genetic issue as 11 well. So you have to address all of those to explain 12 what is going on. 13 This author and Adami both point out that when 14 the evidence in animals shows clearly that these 15 chemicals have an adverse effect on the body. And the 16 teasing part, just the increased risk of, let's say, 17 breast cancer, may not be the whole story. You need to 18 look at all of the cancers and you need to look at the 19 susceptibility factors -- I mean, the stuff that we have 20 been talking about. 21 Q And the fact is that this search for what 22 environmental factors cause breast cancer is an ongoing 23 effort; is that right? 24 A Yes. As you know, the rate of breast cancer 25 has been increasing steadily in the United States in the</p> <p style="text-align: center;">Page 904</p>	<p>1 hypothesis that environmental factors lead to the 2 increased risk of breast cancer. 3 And it appears to me at least that the 4 hypothesis is still under study and we have not yet 5 isolated what is causing this increased risk? 6 A I believe we've got some pretty good ideas and 7 as we go through these papers today, it becomes clear 8 that there are some very strong links that are shown 9 both by animal and human studies. We may not have all 10 of the elements. 11 In other words, if we don't do the right study, 12 we are not going to get the right response. And I think 13 the issue of environmental factors are causative of 14 breast cancer is irrefutable. The question is what are 15 the factors in our environment that are causing it. 16 As you can probably tell just by the number of 17 studies that have been done, one of the leading factors 18 is these organochlorines, including the dioxins and the 19 PCBs; and the organochlorine pesticides. 20 And I think it is irrefutable that these are 21 probably are playing some role in the process. Now, we 22 are also going to be talking about PAHs, which is 23 another ubiquitous environmental factor in our 24 environment, which has increased in our society and as a 25 result of our heavy use of internal combustion engines</p> <p style="text-align: center;">Page 906</p>

1 and heavy dependence upon various fuels to generate
2 energy, that increased level of PAH exposure in
3 industrial societies are quite common.

4 There is additional factors that I think are
5 important and have not been addressed by any of the
6 studies so far. And a couple of animal studies have
7 addressed it, but what if you have significant PAH and
8 organochlorine exposure together, what is the breast
9 cancer risk going to be in a population?

10 Certainly, the animal studies would suggest the
11 phenomenon of the dioxins increasing the enzymes in the
12 body to create more of the PAH toxic intermediates would
13 strongly suggest that the two would interact to increase
14 the risk of cancer; and in particular, the risk of
15 breast cancer.

16 And we know also in the same 40 to 50 year
17 period, that there has been a very large increase in
18 lung cancer risk.

19 And obviously, there has been a linkage to
20 cigarettes, but there is also probably other factors.
21 And those factors have been identified as the urban
22 factor; that is, that if you compare the cancer rates in
23 Nebraska with the cancer rates in the industrialized
24 portions of New Jersey or Texas, there is as much as
25 190-fold difference in risk.

Page 907

1 You can have certain census tracts where the
2 risk of breast cancer is contestably small for lung
3 cancer and you go into other areas and the rates are
4 order of magnitudes higher. What is causing that?
5 Well, that is called the urban factor, but it is clear
6 it has something to do with environmental factors.

7 Q We talked, I think, in the first session of
8 your deposition about childhood asthma just as an
9 example, and the fact that someone who lives in a farm
10 environment or a rural environment is by no means
11 unexposed, that there are a lot of exposures in that
12 environment as well?

13 A Yes. I am just talking about the cancer risks
14 and the observed studies. I didn't say people on farms
15 had no exposure.

16 Q No.

17 A But the point is that there is a difference.

18 Q There is an observed difference between urban
19 and nonurban environments?

20 A That's right. And the difference can be very
21 large.

22 Q I want to go back to a statement. Will you
23 agree that there are at least three issues that are
24 under study with respect to this increased risk of
25 breast cancer; that is, one, what are the environmental

Page 908

1 factors which lead to the increased risk; No. 2, how
2 much of an exposure is enough to increase the risk and
3 3, what is the critical exposure window for humans?

4 A Right, those are at least three of the issues.

5 Q Let's address one of those. This is deposition
6 Exhibit 156. It is the Anderson paper. It is entitled
7 Critical Exposure Window -- I'm sorry. Critical Windows
8 of Exposure for Children's Health: Cancer in Human
9 Epidemiological Studies and Neoplasms in Experimental
10 Animal Models.

11 Do you so see that?

12 (Defendants' Exhibit 156 was marked
13 for identification by the court
14 reporter.)

15 THE WITNESS: Yes.

16 BY MR. HOPP:

17 Q It says, in the Abstract, "The evidence
18 for exposures occurring during the
19 preconceptional period that have an
20 association with childhood or
21 adulthood cancers is equivocal"; is
22 that right?

23 A That is what it says.

24 Q Does this paper help bring any clarity to the
25 situation? That is, does it identify critical windows

Page 909

1 of exposure for children's health?

2 A Yes.

3 Q And tell me what the conclusion is --

4 A Well --

5 Q -- with respect to critical exposure.

6 A They give a diethylstilbestrol example.

7 Q That is the DES; that was the morning sickness
8 drug?

9 A No, it was the threatened abortion drug, as I
10 recall. They would give women diethylstilbestrol if
11 there was some spotting or bleeding or contractions and
12 that sort of stuff. I don't believe they used that to
13 treat nausea, but that is my recollection of what DES
14 was given for.

15 Q Got you. It is no longer on the market, DES?

16 A DES is no longer administered for that purpose.
17 I don't even think it is generally available as a
18 treatment for menopause.

19 Q Does the Anderson paper address organochlorines
20 or PAHs?

21 A Well, I don't recall if they used any of the
22 examples from that literature or not. They used PAH and
23 one of their examples was 712 dimethylbenz[a]anthracene
24 (DMBA).

25 And they talked about the sensitivity was

Page 910

<p>1 greatest at the end of gestation and the number of 2 targets cells are highest. And let's see, what else? 3 And ENU is another chemical. 4 Q What is ENU? What classic chemical? 5 A That is ethylnitrosourea. It is a non-PAH 6 organochlorine, but it is a nitrosamine compound, 7 nitrosourea compound. Let's see. We have on page -- 8 well, they are not numbered. 9 MR. PRUDHOMME: Some of them are cut off. 10 THE WITNESS: That's right. It looks like it 11 might be page 11. Yeah. It says here -- it talks about 12 another PAH. 13 "Also in mice, the genetic ability to 14 respond to inducers of cytochrome 15 P4501A1, which metabolizes PAHs, 16 determined numbers of lung and liver 17 tumors induced by 18 3-methylcholanthrene and DMBA [but, 19 interestingly, not benzo(a)pyrene 20 (BP)], confirming that metabolic 21 activation of carcinogens is a 22 limiting factor in transplacental 23 carcinogenesis for at least some 24 chemicals." 25 Q But the conclusion of the paper, let's look at</p> <p style="text-align: center;">Page 911</p>	<p>1 opinion, that makes the evidence much less equivocal. 2 In utero exposure is terribly important to -- 3 to the ultimate outcome in those children who are so 4 exposed. What they showed, I think, was prematurity, 5 low postgestational birth weights and some developmental 6 problems associated with in utero exposure. 7 So, I mean, the evidence is, I think, as they 8 say in here in animals is quite clear. And there has 9 been additional evidence in humans that has 10 strengthened, I think, that point about the greater 11 susceptibility of the fetus because of its development, 12 making it more vulnerable to the low level effects of 13 these environmental chemicals. 14 Q Has Perera or anybody else identified prenatal 15 in utero or perinatal exposure to PAHs as a risk for 16 breast cancer later in life? 17 A I think it was shown for dioxin in animals 18 only. I don't think there are human studies and I don't 19 think that has been done in PAHs in animals, as I 20 recall. 21 Q Just as of right now or as of today or as of 22 recently, just dioxins in animals; is that right? 23 A That's right. 24 Q Does virus exposure increase the risk of 25 cancer?</p> <p style="text-align: center;">Page 913</p>
<p>1 page, I guess, it is 13 of 25, where it says, "Gaps in 2 knowledge." 3 A Yes. 4 Q Where they basically say -- they do say. 5 "Although animal models have shown 6 that cancer risk can be increased 7 after exposure to certain potentially 8 hazardous agents -- 9 preconceptionally, in utero, and 10 perinatally -- in humans, much of the 11 evidence is equivocal" and it remains 12 so; is that right? 13 A No, that's not true. 14 Q Okay. 15 A I mean, Perera has several papers published in 16 the last five years, including one this year, that 17 clearly shows that cord blood PAH levels is associated 18 with increased risk of various health problems. 19 Q That is Francesca Perera? 20 A Correct. 21 Q And have you cited those papers in your 22 bibliography? 23 A I hope so, but if not, it was an oversight. 24 The point being, this was published in 2000. And I 25 think there has been quite a few papers, at least in my</p> <p style="text-align: center;">Page 912</p>	<p>1 A In animals there is some evidence that there 2 are some viral-related cancers. Humans the evidence, I 3 believe, is really quite a bit less. 4 Q Is that something that is under study 5 somewhere? I mean, are people looking at a connection 6 between viruses and an increased risk of breast cancer? 7 A People have looked at that for 50 years. It is 8 the most well-studied question, I think, that is out 9 there. 10 Viral illness generally follows a communicable 11 disease pattern. There is a particular liver cancer in 12 Africa that has been linked to a virus, but none of the 13 -- and in the pattern of distribution of the disease is 14 compatible with an infectious causation. 15 But none of the studies that have been done in 16 other countries have ever been able to make a conclusive 17 link with virus and cancers. 18 Q And any cancers or just breast cancer? 19 A Basically, I think, it's -- I mean, other than 20 your increased risk of getting cancer if you have got 21 HIV, and that is different. That is an immune system 22 problem. 23 Q Sure, that is different. 24 A But the virus being the initiator or the 25 promoter of human cancer, I just don't think that there</p> <p style="text-align: center;">Page 914</p>

14 (Pages 911 to 914)

1 has been any evidence to support that notion at least
2 not in the United States.
3 Q Okay. Let's look at Exhibit 157. This is the
4 Arcaro, A-R-C-A-R-O, paper entitled Antiestrogenicity of
5 Environmental Polycyclic Aromatic hydrocarbons in Human
6 Breast Cancer Cells; right?
7 (Defendants' Exhibit 157 was marked
8 for identification by the court
9 reporter.)
10 THE WITNESS: Yes.
11 BY MR. HOPP:
12 Q --And this is an Arcaro study; is that right?
13 A Correct.
14 Q So what Arcaro and co-authors were studying
15 were cells in a petri dish; right?
16 A That's right.
17 Q Let's turn to the Materials and Methods
18 section, this is Page 116 under heading 2.
19 A Um-hmm.
20 Q It says, "Recombinant human ER" and then a
21 Greek symbol that I can't --
22 A That's an alpha.
23 Q Alpha and beta?
24 A Beta.
25 Q "-- were obtained from Panvera --" which looks

Page 915

1 to be some sort of company in Madison, Wisconsin.
2 A That's right.
3 Q What is that? What is recombinant human ER
4 alpha and beta?
5 A To be a little succinct here, I think they got
6 ER positive breast cancer cells.
7 Q Oh, I see.
8 A And obtained them from this company that grows
9 up various -- when you have cancer cell line, you can
10 keep it growing. Because if you take most normal cells,
11 they won't keep growing in vitro, in a dish culture. It
12 will go through a period of time and then they will die.
13 Whereas cancer cells live on and forever, which
14 is one of the problems with cancer cells. They don't
15 have -- they don't have a mechanism to stop them from
16 reproducing.
17 So they have got cells here with alpha and beta
18 estrogen receptors. This is a very succinct paper,
19 which they don't necessarily tell you all of those --
20 Q They ordered cells from a company that cultures
21 them, as opposed to going out and harvesting cells from
22 a group of people; right?
23 A Right. They bought the cancer cells.
24 Q Got it. And what did they conclude?
25 A Their conclusion was that it was antiestrogen.

Page 916

1 They used, I guess, in order to inhibit the growth of
2 these cells --
3 Q They looked at a total concentration of 14
4 PAHs; right?
5 A They combined some together. Individual PAHs
6 comprising the reconstituted mixtures. So they had 14
7 PAHs.
8 Q And actually, got it from the St. Lawrence
9 River in some sediment sample.
10 A They got it from some sediment sample, yeah. I
11 think they purified it. Extracted it in some way.
12 You know, "The most prominent
13 Molecular ions for the 16 US
14 Environmental Protection Agency
15 (USEPA) Priority Pollutant PAHs" and then they
16 number the 16. And they then in Table 1, give you the
17 concentration from the St. Lawrence River sediment of
18 the various compounds and then compared it to a clean
19 place, I think, Kinderhook is supposed to be clean --
20 relatively clean. And here I think the levels are much
21 lower.
22 Q Kinderhook is another place in New York; right?
23 A Yes. And I think what they used was that as a
24 control. Kinderhook being relatively clean.
25 Q So they found that these compounds acted as an

Page 917

1 antiestrogen?
2 A I believe they inhibited the growth of these
3 cells. No, no, they did a whole cell competitive
4 estrogen receptor binding assay. So, basically, they
5 looked at a receptor binding assay using radioactive
6 hydrogen attached to the various -- let me see, is it
7 estrogen they used?
8 Competitive binding assay was carried out with
9 the human estrogen receptor, alpha or beta, incubated
10 with -- E2, I think, is an estrogen compound, estradiol
11 or something is their control -- positive control. Yes,
12 17 beta estradiol. And so they exposed the cells to
13 estradiol or PAHs and then measured the binding of the
14 two.
15 Q Okay. And their conclusion was?
16 A The conclusion was that it was antiestrogenic
17 and I think competitively bound with the estrogen
18 receptor.
19 Q So how, if at all, does the Arcaro paper
20 support your opinions in this case?
21 A Well, it shows that PAHs binded the estrogen
22 receptor, which, of course, we have known from other
23 assays.
24 Your question is why did we include this in our
25 bibliography?

Page 918

<p>1 Q Let's use that question.</p> <p>2 A The findings indicate that "seven</p> <p>3 PAHs competitively displace estradiol</p> <p>4 when added to cultures of human</p> <p>5 breast cancer cells may have</p> <p>6 consequences for human health. It</p> <p>7 has been suggested that by the</p> <p>8 binding with the estrogen receptor</p> <p>9 carcinogens may accumulate in the</p> <p>10 nucleus and result in increased</p> <p>11 mutagenicity. The PAHs examined in</p> <p>12 this study are common environmental</p> <p>13 pollutants that are metabolized in</p> <p>14 the body and thus could potentially</p> <p>15 bind the estrogen receptor, resulting</p> <p>16 in both a suppression of estrogenic</p> <p>17 responses and a possible increase in</p> <p>18 mutations in specific target issues."</p> <p>19 Q Okay.</p> <p>20 A Do you want me to explain what that means? Do</p> <p>21 you think you understand it?</p> <p>22 Q I think I understand it, but can you give it to</p> <p>23 me in layman's terms?</p> <p>24 A Well, these in vitro studies are mechanism</p> <p>25 studies. And what this study showed is that the PAHs</p> <p style="text-align: center;">Page 919</p>	<p>1 know cancer is a multistep process.</p> <p>2 Q And PAHs are generally considered to be</p> <p>3 genotoxic; correct?</p> <p>4 A That's correct.</p> <p>5 Q As opposed to organochlorines which are not</p> <p>6 genotoxic but induce some sort of enzyme production?</p> <p>7 A Yes. And the relevance here is that they</p> <p>8 induced an enzyme that metabolizes the PAHs to their</p> <p>9 genotoxic or mutagenic toxic intermediates, where they</p> <p>10 become apoxides and become more active in attaching to</p> <p>11 the DNA.</p> <p>12 Q So the binding to the receptor is one step in a</p> <p>13 chain reaction?</p> <p>14 A Well, that would be the implication of this</p> <p>15 paper, yes.</p> <p>16 Q And on Page 125, they talk about looking for</p> <p>17 synergistic activity and state that they were unable to</p> <p>18 find any; is that right?</p> <p>19 A Well, let's see what they meant by -- what</p> <p>20 paragraph are you looking at?</p> <p>21 Q Page 125, first full paragraph, "Recently</p> <p>22 the issue of synergy among endocrine</p> <p>23 disrupting chemicals has received</p> <p>24 much attention? Although we did not</p> <p>25 look specifically for synergistic</p> <p style="text-align: center;">Page 921</p>
<p>1 bind to the estrogen receptor.</p> <p>2 Q But we need to figure out based on additional</p> <p>3 studies is what that means for human health; right?</p> <p>4 A In the context of everything else, we know that</p> <p>5 all the PAHs are potent mutagens. They imply that and</p> <p>6 discuss it here, but clearly, it has profound</p> <p>7 implications really for the role of PAHs in breast</p> <p>8 cancer.</p> <p>9 Q But isn't the working hypothesis that breast</p> <p>10 cancer is caused by higher levels of estrogen as opposed</p> <p>11 to lower levels of estrogen?</p> <p>12 A Well, that is one mechanism. I believe they</p> <p>13 are addressing the mutagenic mechanism here. If it is</p> <p>14 concentrating because it is attaching to the receptor</p> <p>15 and there are a lot of estrogen receptors in the breast</p> <p>16 for obvious reasons. So something is bound to that</p> <p>17 receptor and it is in that tissue, it is more likely --</p> <p>18 in other words, the dose makes the poison.</p> <p>19 So the higher the concentration of PAH</p> <p>20 molecules in the breast tissue, the more likely it is to</p> <p>21 exert mutagenic, thus a carcinogenic effect.</p> <p>22 Q Okay. So we are not looking at enzyme</p> <p>23 induction, we are looking at genetic damage?</p> <p>24 A That's correct. In other words, there is more</p> <p>25 than one mechanism at work probably to cause cancer. We</p> <p style="text-align: center;">Page 920</p>	<p>1 responses, the antiestrogenic</p> <p>2 potencies of the reconstituted</p> <p>3 mixtures in the focus assay were</p> <p>4 roughly an average of the</p> <p>5 antiestrogenic potencies of the</p> <p>6 individual PAHs, suggesting that no</p> <p>7 substantial overall synergy</p> <p>8 occurred."</p> <p>9 A Well, that means that -- it speaks for itself,</p> <p>10 I think. That there is no synergy between the PAHs, one</p> <p>11 versus ten. It is an additive effect only, not a</p> <p>12 multiplicity effect.</p> <p>13 Q Let's do one more and take a break.</p> <p>14 MR. HOPP: Is that okay, Keith?</p> <p>15 MR. PRUDHOMME: Yeah, I will refer to the</p> <p>16 witness.</p> <p>17 MR. HOPP: I'm sorry, Doctor. Can we do one</p> <p>18 more?</p> <p>19 THE WITNESS: We can do one more.</p> <p>20 MR. HOPP: My apologies.</p> <p>21 (Defendants' Exhibit 158 was marked</p> <p>22 for identification by the court</p> <p>23 reporter.)</p> <p>24 BY MR. HOPP:</p> <p>25 Q Deposition Exhibit 158 is the Chaloupka,</p> <p style="text-align: center;">Page 922</p>

<p>1 C-H-A-L-O-U-P-K-A, paper titled Synergistic Activity of 2 polynuclear Aromatic hydrocarbon mixtures as aryl 3 hydrocarbon (Ah) receptor agonists. 4 This is an in vitro study of human breast cells 5 and an in vivo study of rats and mice; is that right? 6 A Yes. 7 Q And the results show that the PAH mixture 8 exhibited nonadditive synergistic activities; is that 9 right? 10 A Yeah, it studied the synergistic effects on 11 PAHs on the Ah receptor. 12 Q This did find synergistic activity? 13 A Yes, it did. Rather marketably. 14 Q I'm sorry. I didn't hear you. 15 A Rather marketably. 16 Q And did they find them in all three media, if 17 you will, studied both the human breast cells and then 18 in the mice and the rats or did they find them in just 19 one of those areas? 20 A Let's see, they used induction of 21 "Hepatic CYP1A1 mRNA levels 22 transformation of the rat cytosolic 23 Ah receptor to a complex which binds 24 to a dioxin responsive element, and 25 the induction of EROD activity and</p> <p style="text-align: center;">Page 923</p>	<p>1 Q Have you ever worked on a lawsuit or evaluated 2 a case that involved an MGP? 3 A No, but I have read about manufactured gas 4 plants. 5 Q And those were plants that were used back in 6 the old days where we used to have gas lights that lit 7 the streets; right? 8 A Yes. 9 Q The old gas lamps? 10 A Yes. They made some natural -- well, some 11 volatile gas out of -- you know, out of crude oil or 12 coal. 13 Q In fact, they took, I think -- my understanding 14 is that they took coal and through some process, made 15 this gas, and then there was a residue, which was this 16 tarry substance? 17 A Tarry stuff, that's right. Similar to 18 creosote. 19 Q Well, in fact, it was a residue from somehow 20 distilling the coal; right? 21 A That's right. Same idea as the creosote. This 22 distillate is pretty close to creosote. 23 Q Well, in fact, there are studies which examine 24 -- 25 A The composition of both, right. Which should</p> <p style="text-align: center;">Page 925</p>
<p>1 antiestrogenicity in MCF-7 human 2 breast cancer cells, and inhibition 3 of splenic plaque-forming cell 4 response to both T cell-dependent and 5 independent antigens in B6C3F1 mice. 6 For EROD and CYP1a1 mRNA induction 7 and cytosolic transformation 8 activities and immunosuppressive 9 effects, MGP-PAH mixture was 10 approximately 100 to 900 times more 11 potent as an Ah receptor agonist than 12 expected based on its benzo[a]pyrene 13 content." 14 And that means that one, two, three, four -- 15 four of the effects were -- were stronger in 16 synergistic. The synergistic activity was still there 17 but lower for the antiestrogenic response in MCF cells, 18 really 19-fold, as opposed to 100 to 900 times greater. 19 So all of the end points showed at a greater 20 effect when they looked at the manufactured gas plant 21 residues, as opposed to just benzo[a]pyrene content 22 predicted. 23 Q Are you familiar with the manufactured gas 24 plants? 25 A Yes.</p> <p style="text-align: center;">Page 924</p>	<p>1 be in our list of papers here, I would hope. 2 Q And so what they did was they took this MGP PAH 3 mixture and administered it to the cells in the rats and 4 the mice and then they took some other PAH containing 5 substance; is that right? 6 A Well, I think they used benzo[a]pyrene. Let me 7 see what did they use for the clean -- cleaner control. 8 Q The idea being they compared the activities of 9 the mixture to the control; is that right? 10 A The control is benzo[a]pyrene which they 11 purchased from Sigma Chemical Company. 12 Q So it is kind of a pure PAH? A single PAH? 13 A Single PAH. 14 Q And then they compared that activity of the 15 multi-PAH mixture? 16 A That's right. 17 Q And they found that the crude MGP PAH mixture 18 had more of an effect than the single PAH? 19 A Correct. 20 Q And then did they compare it -- compare the 21 activity of the MGP PAH mixture to the activity of 22 TCDD? 23 A Yes, they did. TCDD was their positive 24 control. 25 Q And, again, they found that the MGP PAH mixture</p> <p style="text-align: center;">Page 926</p>

<p>1 had more effect than the TCDD, which is the positive 2 control?</p> <p>3 A Where is this data? Here it is on Table 3, the 4 dose effect of the three. TCDD was -- it had -- TCDD 5 had a greater effect than either the benzo[a]pyrene or 6 the MGP.</p> <p>7 Q Did they study a synergistic effect between 8 TCDD and the MGP PAH mixture?</p> <p>9 A I don't think so. It would have been a very 10 interesting thing to do but they didn't.</p> <p>11 Q And this is one of the things that you are 12 talking about in this case, which is the potential for 13 that synergy; is that right?</p> <p>14 A Yes.</p> <p>15 Q Now, this study does not indicate any sort of 16 relative risk for breast cancer in humans; does it? It 17 is not that type of study.</p> <p>18 A No, that is not that kind of study. It is not 19 addressing the issue directly. It is sort of a 20 mechanism paper, but I thought it was important because 21 it talks about a mixture similar to creosote and how it 22 has an effect on the Ah receptor, which would add to the 23 adverse effect caused by that mechanism.</p> <p>24 Q Right. So, generally, informative but not 25 directly related to causation of breast cancer in</p> <p style="text-align: center;">Page 927</p>	<p>1 pesticides -- mostly insecticides of 2 organochlorine origin and phenoxy 3 acid herbicides -- and risk of 4 cancer."</p> <p>5 Do you see that?</p> <p>6 A Yes.</p> <p>7 Q And that is, basically, the conclusion of this 8 paper "some limited evidence"; is that right?</p> <p>9 A Yes. I mean, I think, those are the words he 10 used, yes.</p> <p>11 Q Does this paper and any of the sources that it 12 reviews, identify an increased risk of breast cancer 13 with exposure to pentachlorophenol or creosote?</p> <p>14 A Let's see what he says about creosote. Some 15 TCDD exposures -- the Adami paper, they quote. They 16 also quote a paper -- a study that is ongoing, has no 17 results, where they mention breast cancer. I think 18 there is relatively few references to breast here.</p> <p>19 The proof of the paper shows no excess risk in 20 farming where the exposures are varied. There was no 21 increased risk in another farmer study done in Sweden. 22 Several farmer studies have mentioned breast and found 23 no excess, not all of them studied breasts.</p> <p>24 Basically, this paper is not really -- it 25 probably shouldn't even be included except that it is in</p> <p style="text-align: center;">Page 929</p>
<p>1 humans; is that right?</p> <p>2 A Correct.</p> <p>3 MR. HOPP: Let's take five minutes. 4 (Brief recess.)</p> <p>5 MR. HOPP: Let's mark this next Exhibit as 159. 6 (Defendants' Exhibit 159 was marked 7 for identification by the court 8 reporter.)</p> <p>9 BY MR. HOPP:</p> <p>10 Q Dr. Dahlgren, I am handing you Deposition 11 Exhibit 159, the Dich, D-I-C-H, study entitled 12 Pesticides and Cancer. And this is a review paper?</p> <p>13 MR. PRUDHOMME: Do you have an extra copy?</p> <p>14 MR. HOPP: I'm sorry.</p> <p>15 THE WITNESS: Um-hmm. Yes, this would be a 16 review paper.</p> <p>17 BY MR. HOPP:</p> <p>18 Q And they looked generally at various pesticides 19 and cancer in animals and humans; correct?</p> <p>20 A Yes.</p> <p>21 Q And the conclusion is -- looking at -- this is 22 now Page 438, in the paragraph entitled Conclusion, it 23 says, "Epidemiologic studies provide 24 some, albeit limited, support of an 25 association between exposure to</p> <p style="text-align: center;">Page 928</p>	<p>1 the general category, talking about the TCDD and it 2 mentions creosote in its -- it really doesn't have very 3 much in the way of data on creosote.</p> <p>4 Q So do you think you should not have listed this 5 as a paper supporting your opinions?</p> <p>6 A Well, first of all, it's by and large not 7 focused on breasts. We probably included it because of 8 some of the other cancers that would have applied to 9 some of the cases, not necessarily Shemie Barnes.</p> <p>10 Q All right. Okay. Let's look at the next one 11 deposition Exhibit 160. This is the Firozi paper, 12 F-I-R-O-Z-I. And it is entitled Aromatic DNA Adducts 13 and Polymorphisms of CYP1A1 and NAT2 and GSTM1 in Breast 14 Cancer; is that right?</p> <p>15 (Defendants' Exhibit 160 was marked 16 for identification by the court 17 reporter.)</p> <p>18 THE WITNESS: Yes.</p> <p>19 BY MR. HOPP:</p> <p>20 Q And this is a study of genetic polymorphisms 21 and DNA adducts; right?</p> <p>22 A Yes.</p> <p>23 Q Tell me in layman's terms what the authors of 24 this paper -- what question the authors of this paper 25 were trying to answer?</p> <p style="text-align: center;">Page 930</p>

18 (Pages 927 to 930)